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# Remediation Action Plan

Proposed Nihon University
9 Church Street, Newcastle

Prepared for
Nihon Daigaku Australia Newcastle Pty Ltd

Project 91667.02
April 2020

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

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**Remediation Action Plan**
**Proposed Nihon University**
**9 Church Street, Newcastle**

## 1. Introduction

This Remediation Action Plan (RAP) outlines the methods and procedures that will be used to remediate the site for the proposed Nihon University development at 9 Church Street, Newcastle. The work was commissioned on 30 October 2019 by Sita Vasanthakumar of Built Pty Limited acting on behalf of Nihon Daigaku Australia Newcastle Pty Ltd and was undertaken with reference to Douglas Partners Pty Ltd (DP) proposal NCL190520 dated 11 September 2019.

The RAP has been developed based on available standards and guidelines prepared by the relevant authorities, and the results of the detailed site investigation conducted by DP (2020a) for the proposed development.

This RAP supersedes the Conceptual Remediation Action Plan (cRAP) prepared by Cardno (NSW/ACT) Pty Ltd (Cardno, 2019) for the development which was based on preliminary investigation findings conducted previously by others. Pertinent information from the cRAP has been referred to in this RAP where applicable.

The previous investigation conducted by DP (2020a), which included a review of previous investigations on the site by DP and others, identified bonded asbestos containing materials (ACM) within filling across the site above the adopted site assessment criteria which require remediation to render the site suitable for the proposed development.

While PAH, heavy metal and TRH impacts were identified on site exceeding the adopted Tier 1 health and conservative ecological investigation / screening levels, statistical analysis and consideration of the ecological setting and proposed development indicated that remediation for these contaminants was not warranted.

This RAP has been prepared to describe the remediation strategy via on-site management of bonded asbestos impacted filling beneath existing and proposed concrete pavements, buildings and associated landscape areas (ie capping of entire site).

The RAP includes an unexpected finds protocol and contingency measures to manage redevelopment works during the course of remediation.

The results of previous soil analysis conducted by DP and others with comparison to NEPC (2013) criteria are provided in Tables 10, 11 and 12 Appendix A.

This RAP details the aims, methods and procedures by which the remediation and site validation will be achieved. It will enable the site to be declared suitable for the proposed university development.

## 2. Methods and Objectives of the RAP

It is proposed that the remediation method will involve the on-site management of soils impacted by bonded ACM by capping the entire site with concrete building slabs and pavements or capping with clean imported filling (virgin excavated natural material (VENM) or excavated natural material (ENM)) or validated on-site soils within landscape areas (where required).

The objective of the RAP is to ensure that the site is remediated in an acceptable manner, with minimal environmental impact, to a condition suitable for the proposed university development. The objectives of this RAP are therefore to provide a strategy for site remediation which:

- Minimises impacts from the site on the environment and on public health and safety during site remediation;
- Maximises the protection of workers involved with site remediation;
- Renders the site safe for the proposed landuse and substantially reduces potential exposure pathways to contaminants;
- Minimises impacts on the local environment during and following site remediation.

The RAP also provides an outline working plan for the excavation, stockpiling, management and disposal of excess spoil and sediment controls and a contingency plan.

## 3. Review of Site Information

### 3.1 Site Description

The site is described as part Lot 1 DP 1199904, 9 Church Street, Newcastle, NSW and comprises a rectangular shaped area of approximately 4880 $m^2$. The site (investigation area) excludes a variable width easement for services along the western boundary of Lot 1 which falls outside the development footprint.

The site was formerly known as the Newcastle Courthouse and comprises three adjoining structures – the original Courthouse, the Administration Building and the Supreme Court Building with a rear carpark (south-east corner) and landscape areas.

The site is shown on Drawing 1 in Appendix B.

The site contains a number of easements, which are outlined on the ADW Johnson Pty Ltd (ADW) detailed survey plan (provided in Appendix B), including the following:

- A 3 m wide easement for water through the site on the eastern side of the original courthouse building;
- A 1.7 m wide easement for services along the northern portion of the eastern site boundary;
- A 3 m wide restriction of use easement on the eastern site boundary adjacent to the Police Station.

## 3.2 Site Condition

A brief site walkover was conducted on 14 November 2019 by a senior environmental engineer from DP to assess pre-demolition site conditions (DP, 2020a).

In general, the site conditions were similar to those observed by Coffey (2012) and Prensa (2016).

Additional items of note are presented below:

- Landscape areas at the rear and front of the property were overgrown with thick vegetation, grass cover evident in garden areas in November 2019. Soils, where exposed, appeared to be dark grey silty sands / sands with some building rubble evident (ie concrete fragments, asphalt, brick etc) and general rubbish evident in some areas;
- Fibro sheeting fragments (potential ACM) were observed at the ground surface near a service pit (south-east corner of former Court House) and north of the rear staircase between the Court House and Supreme Court Building where building rubble and slag gravel was observed. The fragment near the service pit was confirmed to contain asbestos (ACM);
- Building rubble was also observed at the surface of the internal garden bed between the Court House and Supreme Court Building;
- The concrete associated with both the Administration Building and The Supreme Court Building was in poor condition in several places with cracking and chipping of concrete evident;
- The rear carpark is asphalt sealed, as is a small area in front of the Court House. Concrete pavements are present around the western and northern perimeter of the Supreme Court Building and the driveway to the east of The Administration Building and in localised areas of landscaping to the south of the Court House and Supreme Court Building with some brick paved areas also present at the front of the site.

Additional observations of site conditions from 3 March 2020 following partial demolition of the former Administration Building (eastern building) are as follows:

There were no obvious indications of gross contamination (ie staining or odours) at the accessible surface following demolition. It is noted, however, that a significant portion of the surface was covered by demolition materials which precluded detailed inspection.

Due to the staging of demolition activities, further subsurface investigations within the Supreme Court Building footprint were conducted via holes cut into the existing slab (ie the Supreme Court Building slab had not been demolished) which precluded detailed inspection of underlying surface soils across this area. Further inspections are proposed following demolition activities as part of future site remediation works and will be reported in the validation report.

Inspections were also conducted by DP on 10, 12, 16 and 18 March 2020 within the Administration Building area during demolition activities. The upper fill materials observed were generally commensurate with those encountered during pre-demolition investigations and contained some to abundant anthropogenic inclusions (ie building waste) including potential ACM at some locations as well as ash and coal.

Further details on site conditions are presented in DP (2020a) including site photos.

## 3.3 Proposed Development

It is understood that the proposed development includes the following:

- Demolition of the existing Administration Building and Supreme Court Building;
- Retaining the original heritage listed Court House Building and change of use from a 'Public Administration Building' to an 'Educational Establishment';
- Construction of two four-storey buildings consisting of a 108 bed 'Student Accommodation Building' (east wing) and an 'Education Building' (west wing), both connected to the proposed 'Public Building' by atria. A carpark for 20 cars is contained on the lowest level of the 'Education Building';
- Heritage listed retaining walls along the southern and western boundary of the site are to remain;
- Construction of retaining walls up to 6 m in height along the southern and western boundaries;
- Decommissioning of the existing tunnel which connects the site to the adjacent Police Station.

While proposed cut / fill drawings were not available at the time of preparing this report, it is understood that finished floor levels of approximately RL 22.3 (AHD) are proposed for the two new buildings, with localised cuts typically up to 1 m to 2 m required. Localised deeper cuts are likely to be required for the proposed rainwater tank and lift wells.

It is understood that a stormwater easement will be diverted within the site as shown on the Cardno's Stormwater Diversion plans in Appendix B. The excavation trench is proposed to be re-instated with clean' materials to minimise restrictions for future maintenance (ie no capping of contaminated soils within the easement). The service trench sides, and floor will be lined with a geotextile marker layer and backfilled with clean soils as discussed below.

It is understood that some deep tree plantings are proposed around the perimeter of the proposed development (refer to Moir landscape plans provided in Appendix B). The landscape design must consider the requirements for 'Site Capping' in accordance with this RAP and conceptualised in Drawing 2, Appendix B.

Reference should be made to the attached site development plans and cross sections in Appendix B for further details.

Based on the above, the development is generally considered to be characterised as high density residential with minimal access to soil with reference to NEPC (2013).

## 3.4 Site History

Site history information was previously presented in the PSI (Coffey, 2012) and DSI (Prensa, 2016) for the site.

DP conducted an additional brief site history review for the DSI (DP, 2020a) which generally indicated the absence of gross contaminated activities at the former Courthouse (the site) and confirmed the presence of decommissioned underground fuel storage tanks (USTs) and a wash bay within the adjacent Police Station basement.

A number of potential on-site and off-site sources of site contamination were identified due to former and current site activities.

Further details of site history are provided in DP (2020a).

## 3.5 Geology and Hydrogeology

Reference to the Newcastle Coalfields Surface Geology Sheet, published by BHP, indicates that the site is underlain by the Lambton sub-group rocks of the Newcastle Coal Measures. The rocks are of Permian age and typically comprise sandstone, siltstone, claystone and multiple coal seams.

The subsurface conditions encountered in the bores / pits conducted for the DSI (DP, 2020a), geotechnical investigation (DP, 2020b) and mine subsidence investigation (DP, 2020c) are presented in detail in the borehole / test pit logs in DP (2020a) and summarised below. These should be read in conjunction with the general notes preceding them (DP, 2020a), which explain definitions of the classification methods and descriptive terms. Soil units are described in detail in DP (2020a).

**CONCRETE:** Encountered in Bore 201, 202 and Geo1 and Pits 302, 303, 304 and 306 from the ground surface to a depth of 0.09 m to 0.15 m.

**ASPHALT:** Encountered in Bore 201 from 0.17 m to 0.19 m and Bores 203 and MS4 from the ground surface to depths of 0.09 m to 0.03 m respectively.

**FILLING (Unit 1):** Encountered in all bores / pits except Geo2 from the surface to 0.1 m / 3.3 m depth and generally comprised sandy gravel / gravelly sands pavement fill with trace slag, coal, ash, asphalt in some bores, underlain by silty clay, clayey sand, sand, silty sand, gravelly silt, sandy gravel, fill with trace coal, slag, ash, asphalt, brick, concrete, tiles, glass, metal, wood, plastic, geo-fabric, shell, fibro sheeting fragments (potential ACM) in some bores / pits.

**SANDS (Unit 2A):** Encountered in Bore 203 from 1.6 m to 2.6 m depth, Geo1 from 3.3 m to 11.7 m depth, Geo2 from 0.1 m to 2.5 m depth and Pits 301 to 304 and Pits 308, 309 from depths of 0.3 m / 0.8 m to depths of >0.8 m to >1.2 m and generally comprising pale grey / grey / brown mottled orange / yellow / dark brown clayey silty sand / clayey sand / sands / silty sands with trace coal / gravel.

**SILTY CLAY / SANDY CLAY (Unit 2B):** Encountered in all bores beneath fill / sands to depths of 4.8 m to 12.1 m and in Pits 306 and 310 beneath filling to termination at depths of 0.7 m to 0.9 m and generally comprised pale grey, brown or grey mottled red / orange clays / silty clays / sandy clays with trace coal and iron cementing.

**SILTSTONE / CLAYSTONE (UNIT 3)**: Encountered in all bores beneath clays to termination at depths of 10 m and 12 m in Bores 201 to 203 and generally comprised pale grey to grey mottled red, slightly to extremely weathered siltstone / claystone. Dark grey carbonaceous bands were observed at 9 m in Bore 201. Refer to DP (2020a) for bedrock conditions in geotechnical bores.

Selected photos of subsurface conditions encountered within test pits conducted on 3 March 2020 are provided below:

**Figure 1 – Pit 307 (3 March 2020) – Note abundant fibro sheeting fragments and demolition waste**

It is noted that Pit 307 was terminated at approximately 0.5 m and immediately backfilled by the client due to the presence of abundant fibre cement sheeting fragments (ie potential ACM). The depth of fill was not assessed as a result nor a detailed log prepared, although it was noted that fill conditions were visually similar to those encountered in Pit 306.

**Figure 2– Pit 309 (3 March 2020) – Note demolition waste**

**Figure 3 – Pit 302 (3 March 2020) – Note fibro fragments within pit walls**

Fill / natural materials observed within stockpiled materials stripped from the eastern portion of the site following demolition of the bulk of the former Administration Building were generally consistent with the fill / natural materials described in the above summary. All stockpiles comprised a mixture of anthropogenic materials (including building materials and ash), and fibro fragments (bonded in sound condition) were observed in Stockpile C on 18 March 2020 stripped from the eastern portion of the site.

Based on acid sulfate soils (ASS) mapping, there are no known occurrences of ASS in the immediate area of the proposed development.

Groundwater was reported to be present (Cardno, 2018) as a shallow rock aquifer approximately 8 m bgl to 12 m bgl. It is noted that shallow (perched) groundwater may be present within the fill (or soil) / bedrock interface. It is understood that the Cardno (2018) geotechnical report encountered groundwater inflow during drilling of BH01 (south-east corner of the site) at a depth of 8 m bgl, and seepage during drilling of BH3 to the north of north-western corner of the site at about 12 m bgl, both in extremely weathered bedrock (silty CLAY).

Similarly, to the Cardno (2018) findings, groundwater was encountered during the DSI (DP, 2020a) within Bore 201 during drilling at approximately 8 m depth within the highly weathered siltstone. Groundwater was also measured at 7.65 m depth in Bore 203 within the highly weathered siltstone prior to recommencement of drilling (open borehole left open overnight). Subsequent gauging of the installed wells (Bores 201 to 203) on 7 January 2020 prior to purging indicated groundwater levels varied from approximately 6.7 m (RL 15.8) to 11.1 m (RL 11.3) below ground level. Groundwater was not encountered within any of the test pits while they remained open.

It should be noted that groundwater levels are affected by factors such as climatic conditions and soil permeability and will therefore vary with time. Based on site topography, the groundwater flow direction is likely to be towards the north/north-west. Refer to Drawing 1 in Appendix B for approximate previous test locations.

It is noted that DP have conducted additional geotechnical and preliminary mine subsidence investigations for the proposed development (DP, 2020a; 2020b). Drilling was conducted to locate the depth, condition and extent of mine workings within the site. It is understood that the Dudley, Yard and Borehole Seams are present beneath the site at depths in the order of 20 m, 40 m and 80 m respectively below existing ground levels, with results (DP, 2020b) indicating that the Dudley Seam is possibly mined under the site and the Borehole Seam has been mined under the site.

## 4. Results of Previous Investigations

The results of the DSI (DP, 2020a) indicated the following:

- Previous investigations by others (Prensa, 2016) has confirmed the presence of elevated contaminants at the site (namely PAHs and lead) above the adopted landuse criteria (ie high density residential land use with minimal access to soil) for the proposed university development;
- Additional contamination testing by DP (2020a) has confirmed the presence of similar contaminants within soils/fill and similar exceedances of the adopted health-based NEPC (2013) SAC (ie PAHs, lead), however, statistical analysis indicated that 95% UCL concentrations were within the adopted site criteria;

- Bonded ACM, however, was confirmed within filling (DP, 2020a) under both buildings (east and west – which will be removed as part of the proposed development), and within the car park and landscape areas (ie all areas of the site proposed for development). Although a detailed asbestos assessment was not conducted, the frequency of ACM observed was deemed to exceed WA DoH (2009) concentration limits based on site observations. Site remediation is therefore required to address ACM impacts across the site. Given the widespread distribution of filling across the site containing building rubble and the observed occurrence of ACM within subsurface formwork, further ACM is likely to be present within the site. On this basis, it was concluded that all fill materials across the site must be considered to be impacted with ACM in the absence of a detailed asbestos investigation and validation as a precautionary measure. It is noted that the central Court House Building will remain, and although the risk of impacted filling beneath this building may be considered to be low (due to the age of the building), the presence of impacted filling across the entire site has been adopted as a precautionary measure in the absence of subsurface investigations beneath the central Court House building which will remain;
- Elevated copper, lead, nickel, zinc and TRH (>$C_{16}$-$C_{34}$) within fill / soil was also identified above the adopted ecological based SAC (ie EIL / ESL) at several locations. The DSI (DP, 2020a) noted that the adopted EILs were derived using conservative soil parameters in the absence of site-specific soil testing. DP (2020a) also noted that the ecological significance of the site is considered to be low considering the site condition and the proposed development;
- Fill materials tested generally met the criteria for classification as 'General Solid Waste' based on total and leachable concentrations. Asbestos impacted soils would be classified as 'Special Waste' (asbestos waste) in addition to the classification of the soil matrix. ACM is likely to be present in upper fill across the site;
- Previous leachability testing in water of two samples with elevated PAHs (Prensa, 2016) indicated the materials tested had a low propensity to leach PAHs. Leachability testing in water of one soil sample with elevated lead (DP, 2020a) indicated that the material had some potential to leach in water, with concentrations above ANZG (2018) criteria. It was noted, however, that the ASLP test method is an aggressive procedure which involves the tumbling of the sample in a leachant (ie distilled water) for a period of 16 to 20 hours, which is not likely to represent natural processes (ie infiltration of rainwater through the material). It was further noted that the lead impact is associated with localised near surface filling, and groundwater (the potential receptor) is located beneath low permeability residual soils at depths > 6 m (ie not in contact with upper fill materials). The results of existing groundwater quality testing also indicated the absence of elevated lead concentrations (ie general absence of impacts to groundwater due to elevated lead concentration in upper fill materials);
- Groundwater testing (DP, 2020a) was generally within the adopted guidelines with the exception of heavy metal concentrations (namely nickel and zinc) which were marginally above the adopted criteria (GILs for marine waters). It was noted that the groundwater concentrations in the up-gradient well (Bore 203) was typically higher or commensurate with concentrations detected in downgradient wells. It was also noted that no obvious visual or olfactory indications of impact to groundwater (ie no obvious staining, odours, slicks or free product) were detected during purging / sampling and no detectable concentrations of hydrocarbons (TRH, BTEX, PAH, VOCs) were identified within groundwater samples;
- Ground gas monitoring (DP, 2020a) indicated the general absence of mine gases or volatile hydrocarbons associated with USTs associated infrastructure and wash bay on the adjacent Police Station, within the bores and existing buildings / site grounds;

- General absence of significant aesthetic issues associated with site contamination.

Based on the DSI (DP, 2020a) findings, DP advised that remediation / management would be required to render the site suitable for the proposed educational facility from a contamination perspective due to the bonded ACM in fill materials across the site.

While PAH, heavy metal and TRH impacts were identified on site exceeding the adopted Tier 1 health and ecological investigation / screening levels, remediation for these contaminants was not considered to be warranted based on statistical analysis and consideration of the ecological setting and the proposed development.

It was also considered that the contaminated fill/soil materials identified on-site are unlikely to be having a significant adverse impact on the groundwater quality and down-gradient receiving water quality given the nature of the contaminants, distribution across the site and the depth and nature of the groundwater identified on-site.

DP noted that the results of the investigations suggest that the USTs on the adjacent Police Station have not resulted in significant contamination to the subject site. In addition, the results of preliminary screening for HGG suggests a risk classification of very low to low with reference to NSW EPA (2019).

DP noted that management of the ACM impacted fill materials under a suitable capping layer to prevent access/exposure from a contamination perspective could be considered at the site. Given the proposed development will comprise buildings with concrete slabs and concrete pavements across the majority of the site (ie minimal landscaping), the proposed development could be used to manage site contamination (ie achieve capping of the entire site).

The results of previous investigations indicate that the bonded ACM impacted soils are situated broadly across the site within filling and also within formwork associated with the central Courthouse building and tunnel which will be retained on-site. Remediation via excavation, stripping and off-site disposal of impacted materials, is therefore not likely to be feasible from both a practical, cost-effective or time-effective perspective based on discussions with the client/developer.

Based on the previous investigations, DP concluded that the site is considered to be suitable for the proposed educational development, subject to appropriate remediation / management of contamination and regulatory approvals.

## 5. Conceptual Site Model

A Conceptual Site Model (CSM) was prepared for the site with reference to the NEPC (2013). The CSM identifies potential contaminant sources and contaminants of concern, contaminant release mechanisms, exposure pathways and potential receptors. The updated CSM in the DSI report identified sources of contamination based on the results of the investigation and is presented in Table 1 below.

The proposed remediation strategy (refer to Section 7) is to manage bonded asbestos impacted soils beneath a suitable capping layer to prevent accessibility. The capping layer would comprise a concrete slab (ie existing and proposed building floor slabs/concrete pavements or a suitable imported clean (ie VENM/ENM) soil or validated on-site soil capping layer in landscape areas. This remediation approach would address the potential exposure pathways described below in Table 1.

**Table 1: Conceptual Site Model**

| Known Sources | Primary Release Mechanism | Secondary Release Mechanism | Impacted Media | Identified Contaminants of Concern | Exposure Pathway | Potential Receptors | |
|---|---|---|---|---|---|---|---|
| | | | | | | Current | Future |
| Filling imported across the site | Placement of filling on-site | Exposure / disturbance during proposed development | Soil | Asbestos | inhalation (dust), ingestion | Site workers, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration | Site workers, residents, maintenance workers, consultants, trespassers, surface water bodies, groundwater, neighbouring properties in the case of groundwater or surface water migration |
| Demolition of former structures or maintenance, renovations to existing / former buildings, underground formwork containing ACM | Demolition / maintenance of buildings / structures | Exposure / disturbance during proposed development | Soil | Asbestos | inhalation (dust), ingestion | | |

## 6. Assessment of Remediation Options

A number of remediation options were reviewed in the cRAP (Cardno 2019) with reference to the principles and criteria defined in the relevant guidelines including NEPC (2013) and NSW EPA (2017).

The two remediation options identified by Cardno which would be suitable for the identified contaminant (ie bonded asbestos)) in fill/soil were as follows:

1. Excavation and off-site disposal of impacted soils;
2. Isolation and management of the soil on-site by containment below a capping layer or hardstand.

The results of the DSI (DP, 2020a) indicate that the bonded ACM impacted soils are situated broadly across the site within filling and within subsurface formwork associated with structures that are proposed to remain in-situ. Remediation via excavation, stripping and off-site disposal of impacted materials, is not likely to be feasible from both a practical, cost-effective or time-effective perspective based on discussions with the client/developer. It is also noted that the central building (ie Court House Building) will be retained as an 'Educational Establishment'. Potentially impacted soils beneath the building to be retained (if any) will also be effectively capped by the existing building (refer to Section 3.3 for the proposed development);

The adopted remediation approach, subject to Site Auditor and regulatory approval, will therefore comprise a combination of Options 1 and 2 above.

Based on the above, the adopted remediation approach for the development is as follows:

- Off-site disposal of bonded asbestos impacted soils from the upper fill profile where required as part of earthworks construction (i.e. excess soils not able to be reused on-site) following appropriate waste classification;
- On-site management (capping) of bonded asbestos impacted soils.

On-site management of bonded asbestos contaminated soil would generally comprise the following:

- Excavation to invert depth of proposed capping layer;
- Placement of excavated contaminated materials in proposed fill areas (ie where beneath the invert depth for the proposed capping layer) where applicable ensuring bonded ACM is not left at the ground surface, subject to geotechnical suitability;
- Disposal of excess contaminated soils to an appropriately licensed landfill following waste classification;
- Capping of contaminated soils with concrete (ie building slabs, concrete pavements) or clean soils within landscape areas. It is noted that given the widespread nature of fill materials containing building waste (potential source of hazardous building materials (HBM) including asbestos) and observed bonded ACM across the site, capping of the entire site will be required (precautionary approach) in the absence of detailed asbestos investigation and validation.

It is noted that existing building and construction of the proposed buildings and pavements will largely provide the above capping, with only localised capping within landscape areas.

If visible bonded asbestos is encountered during earthworks, the material will either be:

- Immediately covered by clean fill to prevent exposure to personnel and demarcated to prevent future disturbance where possible;
- Excavated and placed immediately in proposed fill areas and covered over to prevent exposure to personnel; OR
- Collected, bagged and disposed to a licensed landfill by appropriately licensed personnel in accordance with SafeWork NSW Code of Practice, regulatory requirements and with reference to the EMP in Section 13.

As outlined above bonded ACM has been used on site within formwork for the former Courthouse building and tunnel which will be retained on-site. Remediation via excavation, stripping and off-site disposal of impacted materials, is therefore not likely to be feasible from both a practical, cost-effective or time-effective perspective based on discussions with the client/developer.

On-site management of contaminated soils is considered to be a feasible remediation option to protect human health and the environment and minimise constraints on the future use of the site for the university development. The adopted remediation approach is considered to be commensurate with NEPC (2013) conservative management responses in the absence of conducting a Tier 2 risk assessment. Similar remediation has been successfully conducted for commensurate contaminated land in the Newcastle area.

The Waste Hierarchy adopted by the NSW EPA is, in order of preference, Avoidance, Resource Recovery and Disposal. A 'Cap and Contain' approach would be consistent with a resource recovery initiative.

# 7. Remediation Goals and Acceptance Criteria

## 7.1 Remediation Goals

The main objective of this remediation approach will be to place bonded asbestos contaminated soil beneath a suitable capping layer to prevent exposure and accessibility. As noted above, given the widespread distribution of filling across the site containing building rubble and the observed occurrence of ACM within subsurface formwork, further ACM is likely to be present within the site. As such capping of the entire site will be required as a precautionary measure in the absence of detailed asbestos assessment and validation.

The capping layer is to comprise:

- A concrete slab/pavement (ie proposed concrete building slabs / pavements) – minimum 100 mm thickness; or
- A minimum of 0.3 m of imported material (ie landscape areas) which must be classified as VENM or ENM, or complies with an appropriate / relevant resource recovery order / exemption (RRO / RRE),or commercially available and certified product (suitable for on-site use) which must be accompanied by a certificate from the supplier (where imported). Validated on-site materials could also be utilised as capping subject to detailed testing (if conducted).

A minimum capping of 300 mm is suggested for landscape areas with general ground cover (ie shallow root system). Increase capping thickness should be utilised where deep rooted vegetation is proposed (ie trees) as shown in Drawing 2 - Conceptual Capping Strategy in Appendix B. Advice should be sought from the landscape designers regarding the required thickness of capping to support the root zone for vegetation within landscape areas. Landscape plans and specifications (refer to Moir landscape plans in Appendix B) must be updated to reflect the remediation requirements.

Conformance with the above capping will require monitoring during construction, plus ongoing monitoring / inspections and maintenance during the life of the development.

Any excess materials requiring off-site disposal must be classified with reference to NSW EPA waste classification guidelines (NSW EPA, 2014a), and disposed to a facility which is licensed to receive such materials. It is noted that previous investigation (DP, 2020a) has indicated the majority of fill materials tested are classified as 'General Solid Waste (non-putrescible)' based on total and leachable (TCLP) concentrations with trace bonded asbestos (Special Waste).

To further reduce the potential impact on the environment and human health, the following additional measures are recommended in the construction of the capping layer:

- Placement of a high visibility orange geo-fabric layer on top of the contaminated fill materials to act as a warning/marker layer and to provide separation from overlying materials. Note: Plastic sheeting could be used as an alternative marker layer beneath concrete slabs/pavements;
- Preparation of a long-term Site Management Plan (SMP). The SMP will outline the precautionary management procedures to be adopted if the permanent capping layer is breached in future. The SMP will also promote awareness of the contamination management and the requirement of avoiding disturbance to the capping where possible. An example SMP will be provided under separate cover.

This process of remediation will substantially reduce the potential for human contact with materials that are contaminated so that the development site can be made suitable for the proposed university development.

## 7.2 Remediation Acceptance Criteria

Achievement of the objective of capping and containment of the bonded asbestos contaminated soil will be demonstrated by the successful installation of a constructed capping layer over the entire site. The existing central building (which will be retained as part of site development) provides the required capping over this area. In the case of contained soils the remediation acceptance criteria (RAC) will not, therefore, take the form of a set of concentrations for various contaminants. Rather, the RAC will be deemed to have been attained when the concrete slab/pavements and soil capping has been successfully installed.

In addition to the above, imported fill used to reinstate site excavations, raise site levels (if required) and for use in the pavement or landscape areas must be classified as VENM or ENM (refer to NEW EPA, 2014b) or a relevant RRO/RRE, and must be accompanied by a certificate from the supplier, otherwise detailed assessment (including analysis of representative samples) will be required prior to use on-site.

If remediation/validation of parts of the site are considered (i.e. as an alternative to capping), the RAC for soils remaining on-site with respect to the proposed landuse and identified contaminants are provided in Table 2 below. On the basis of the findings of the previous investigation, the contaminants of concern are largely PAH, heavy metal, asbestos and TRH.

It is considered that the validation analysis should focus on the identified contaminants of concern. In order to provide for contingency situations, however, RAC are also established for other contaminants (ie TRH, BTEX, PAH, Heavy Metals, PCB, OCP etc). This should, however, only be used as and when required (ie if signs of such contaminants are observed, suspected or found) and where contamination is not suitable for on-site management.

The adopted criteria are as follows:

- NEPC (2013) - Health Investigation Levels (HIL) and Health Screening Levels (HSL) for high density residential landuse with minimal access to soils (HIL B/HSL B);
- NEPC (2013) - Management Limits for Residential, Parkland and Public Open Space Landuse – Coarse Soil Texture for TRH impact;
- NEPC (2013) – Ecological Investigation Levels (EIL) and Ecological Screening Levels (ESL) for urban residential and public open space;
- CRC Care (2011) – Petroleum based HSL for direct contact for high density residential landuse with minimal access to soils (HSL B);
- CRC Care (2017) -) Risk-based Management and Remediation Guidance for Benzo(a)pyrene.

For the purposes of providing a single RAC for each analyte the lowest of the above criteria (ie most conservative) has been adopted as the RAC as shown in Table 2 below.

**Table 2 – Site RAC for Soil (mg/kg)**

| Contaminant | NEPM HIL B[b] / HSL B[c] | NEPM EIL / ESL[g] Residential / Open Space | CRC Care Direct Contact - HSL B[a] | NEPM Management Limits – Residential / Open Space Landuse / Coarse Soil[d] | Adopted RAC (mg/kg) |
|---|---|---|---|---|---|
| Asbestos [e] | 0.001% for FA and AF; 0.04% w/w for ACM over the impacted volume; and No visible asbestos for surface soils. | NC | NC | NC | Nil (imported fill and excavation validation) OR 0.001% for FA and AF, 0.04% w/w for ACM & No visible asbestos for surface soils for existing filling |
| Arsenic | 500 | 100 | NC | NC | 100 |
| Cadmium | 150 | NC | NC | NC | 150 |
| Chromium | 500 | 190 (Cr III) | NC | NC | 190 (Cr VI) |
| Copper | 30,000 | 55 | NC | NC | 55 |
| Lead | 1200 | 1100 | NC | NC | 1100 |
| Mercury | 120 | NC | NC | NC | 120 |
| Nickel | 1200 | 9 | NC | NC | 9 |
| Zinc | 60,000 | 150 | NC | NC | 150 |
| TRH ($C_6$-$C_{10}$)-BTEX (F1) | 45 | 180 | 5600 | 700 | 45 |
| TRH (>$C_{10}$-$C_{16}$)-Naphthalene (F2) | 110 | 120 | 4200 | 1000 | 110 |
| TRH (>$C_{16}$-$C_{34}$) | NC | 300 | 5800 | 2500 | 300 |
| TRH (>$C_{34}$-$C_{40}$) | NC | 2800 | 8100 | 10,000 | 2800 |
| Benzene | 0.5 | 50 | 140 | NC | 0.5 |
| Toluene | 160 | 85 | 21,000 | NC | 85 |
| Ethylbenzene | 55 | 70 | 5900 | NC | 55 |

**Table 2 – Site RAC for Soil (mg/kg) (continued)**

| Contaminant | NEPM HIL B[b] / HSL B[c] | NEPM EIL / ESL[g] Residential / Open Space | CRC Care Direct Contact - HSL B[a] | NEPM Management Limits – Residential Landuse / Coarse Soil[d] | Adopted RAC (mg/kg) |
|---|---|---|---|---|---|
| Xylene | 40 | 105 | 17,000 | NC | 40 |
| Total PAH | 400 | NC | NC | NC | 400 |
| Benzo(a)pyrene | NC | 33[h] | NC | NC | 33 |
| Benzo(a)pyrene TEQ | 4 | NC | NC | NC | 4 |
| Naphthalene | 3 | 170 | 2200 | NC | 3 |
| PCBs | 1 | NC | NC | NC | 1 |
| Phenols (Pentachlorophenol) | 130 | NC | NC | NC | 130 |
| DDT + DDE + DDD | 600 | NC | NC | NC | 600 |
| DDT | NC | 180 | NC | NC | 180 |
| Aldrin and Dieldrin | 10 | NC | NC | NC | 10 |
| Chlordane | 90 | NC | NC | NC | 90 |
| Endosulfan | 400 | NC | NC | NC | 400 |
| Endrin | 20 | NC | NC | NC | 20 |
| Heptachlor | 10 | NC | NC | NC | 10 |
| HCB | 15 | NC | NC | NC | 15 |
| Methoxychlor | 500 | NC | NC | NC | 500 |
| Mirex | 20 | NC | NC | NC | 20 |
| Toxaphene | 30 | NC | NC | NC | 30 |
| Chlorpyrifos | 340 | NC | NC | NC | 340 |

Notes for Table 2:

a CRC Care (2011) – Petroleum based HSL for direct contact – Table B4

b NEPC (2013) Health-based investigation levels (HIL) – Table 1A(1)

c NEPC (2013) Health-based screening levels for vapour intrusion (Sand 0 to <1 m) – Table 1A(3)

d NEPC (2013) Management Limits for TPH – Table 1 B(7)

e WA DOH (2009) – Trigger levels for residential landuse with minimal access to soils

f Adoption of a lower RAC should be considered when the material will be below the water table or potentially in contact with surface water due to the leachable characteristics of Naphthalene.

g EIL/ESL apply to the top 2 m of the soil profile. Some EILs are based on conservative soil parameters, which may be increased subject to the results of additional analysis of pH, CEC.

h CRC (2017) high reliability screening level for aged contamination adopted in lieu of NEPC (2013) low reliability value

NC No Criteria

NEPC (2013) provides the following definitions for forms of asbestos:

- Bonded **asbestos containing material (ACM)** comprises ACM which is in sound condition, although possibly broken or fragmented, and where the asbestos is bound in a matrix such as cement or resin (eg asbestos fencing and vinyl tiles). This term is restricted to material that cannot pass a 7 mm x 7 mm sieve. This sieve size is selected because it approximates the thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and hence potential for fibre release;
- **Fibrous asbestos (FA)** comprises friable asbestos material and includes severely weathered cement sheet, insulation products and woven asbestos material. This type of friable asbestos is defined here as asbestos material that is in a degraded condition such that it can be broken or crumbled by hand pressure. This material is typically unbonded or was previously bonded and is now significantly degraded (crumbling);
- **Asbestos fines (AF)** include free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve. Bonded ACM fragments to pass through a 7 mm x 7 mm sieve implies a substantial degree of damage which increases the potential for fibre release.

From a risk to human health perspective, FA and AF are considered to be equivalent to 'friable' asbestos.

### 7.3 Long Term Management

A long term Site Management Plan (SMP) is required for on-site management of contamination. The SMP would be prepared at the completion of remediation works. The SMP will promote awareness of the contamination management and the requirements to avoid disturbance (where possible), and provide an outline and maintenance requirements.

While no active long term management is envisaged, the SMP will recommend routine inspections of the capping layer to monitor for erosion, cracking, settlement or movements of the capping slab/pavements and landscape areas. Maintenance would be required if the site inspection indicates that the capping layer is not operating effectively.

The SMP must be noted on the Section 10.7 planning certificate to ensure future landholders or future developments on the site are aware of the management requirements for the site.

An example SMP will be provided under separate cover.

## 8. Responsibilities

In order to achieve the goals of the remediation / earthworks programme, the following roles and responsibilities have been identified for the contractor and consultants:

**Contractor (Built)**

The contractor is responsible for on-site operations including:

- Demolition of site structures and clearance following demolition;
- Handling of fill materials (contaminated or otherwise) including excavations, stockpiles, segregation, placement, compaction, and disposal of unsuitable or excess materials;
- Disposal of contaminated soil or excess fill to a licensed landfill (after classification) if required;
- Safety of all personnel on site;
- Measures to minimise environmental effects;
- Preparation of a site-specific Construction Environmental Management Plan (CEMP) and WHS plan. The CEMP must reference this RAP and will require review and comment by DP to confirm consistency with the objectives of the RAP prior to commencement of remediation;
- Ensure required licenses and approvals from regulatory authorities are obtained prior to remediation works commencing. It is noted that an appropriately licenced contractor will be required to conduct earthworks within the site due to the presence of bonded ACM in filling;
- Collation of waste/ import tracking documentation, disposal dockets, delivery receipts, air monitoring records etc and submission to the client and DP in a timely manner for review and inclusion in the validation report.

**Occupational Hygienist (OH)**

- Advice on management of asbestos contamination (if required);
- Set-up and maintenance, analysis and reporting of air monitoring for air borne asbestos fibres during construction works resulting in the disturbance of fill materials (i.e. any excavations, stockpiling, placement or transport of fill materials), where required. It is noted that minor ACM fragments were observed within filling at the site, however, there is a risk that further ACM is present.

**General Site Validation (Douglas Partners Pty Ltd)**

- Advice on excavation and segregation of contaminated soils (where required);
- Validation of excavations (where required);
- Regular inspections of remediation and validation works;
- Waste classification of soil / fill requiring off-site disposal;
- Review of proposed imported material reports / certificates to confirm suitability for use on-site prior to importation;
- Sampling and classification of imported fill materials (where required);
- Provision of a remediation and validation report;
- Correspondence/liaison with the Site Auditor and regulatory authority (if required) throughout the remediation works;
- Provision of a long term SMP.

**Client**

- Overall project management;
- Engaging suitably qualified remediation contractor, and Environmental Consultant to conduct the remediation works;
- Ensure necessary approvals and notifications have been obtained prior to remedial works commencing;
- Liaison with the Site Auditor, regulator, environmental consultant, remediation contractor during remediation process;
- Submission of validation reports to regulator.

Prior to the commencement of remedial works, a site meeting between the client, contractor and environmental consultant is recommended to confirm responsibilities and procedures in accordance with the agreed management plan.

## 9. Regulatory Approvals and Licences

State Environmental Planning Policy No 55 (SEPP 55) - Remediation of Land (NSW EPA, 1998) aims to provide a state-wide planning approach to the remediation of contaminated land. Under clause 7(1) of SEPP 55 the approval authority is required to consider whether the land is contaminated, and:

a) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out; and

b) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

This RAP presents the proposed management and remediation options to address contamination on site. Implementation of the RAP will render the site suitable for the proposed development.

In accordance with Clause 9 of SEPP 55 the definition of Category 1 remediation works which require development consent are as follows:

a) designated development; or

b) carried out or to be carried out on land declared to be a critical habitat; or

c) possibly have a significant effect on a critical habitat or a threatened species, population or ecological community; or

d) development for which another State environmental planning policy or a regional environmental plan requires development consent; or

e) carried out or to be carried out in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:

   i) coastal protection;

   ii) conservation or heritage conservation;

iii) habitat area, habitat protection area, habitat or wildlife corridor;

iv) environment protection;

v) escarpment, escarpment protection or escarpment preservation;

vi) floodway;

vii) littoral rainforest;

viii) nature reserve;

ix) scenic area or scenic protection;

x) wetland; or

f) carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands commissioner).

In addition, the Site Auditor's Review of Concept RAP (GHD, 2019) indicates that Newcastle City Council (NCC) letter dated 10 October 2019 that indicated that on-site containment of contamination would be Category 1 remediation works.

Based on the above and the adopted remediation approach (on-site management), it is understood that site remediation works are considered to be Category 1 remediation works requiring development consent.

It is understood that development consent was approved by the NSW Government under SSD 9787 on 11 December 2019, which included demolition of the Administration Building and Supreme Court Building, site remediation works and bulk earthworks below existing ground level and construction of the two new buildings. The SSD consent conditions required additional site investigation (DP, 2020a) and update of the conceptual RAP by Cardno (2019) to reflect the findings of the additional investigation prior to commencement of construction (ie this RAP). The SSD consent condition also required these documents to be approved by an NSW EPA Accredited Site Auditor.

Additional details are also provided in the SSD consent conditions in regard to the preparation, Auditor approval and implementation of a long-term environmental management plan for the site following completion and validation of remediation works.

Based on review of Appendix D of the Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017), the following consent, notification or licence requirements are anticipated:

- Any conditions outlined in the SSD consent conditions;
- Notifications of the consent authority;
- EPA licences or permits for the transportation and disposal of wastes under the POEO Act;
- WorkCover NSW asbestos removal work licence under the WHS Regulation 2011 and appropriate notification prior to commencement;
- Site asbestos register to include reference to ACM impacts in soil and the long term SMP in accordance with the relevant WHS regulations;

- A groundwater interference permit through the NOW may need to be obtained prior to construction commencing if groundwater dewatering was proposed as per the requirements of the NSW Aquifer Interference Policy September 2012. Given mine workings requiring grouting have been shown to be dry, groundwater extraction / dewatering is not likely to be required for the development.

It is understood that the proposed development may be staged and conditional, upon the following:

- Submission of staged validation reports for the site;
- Submission of a staged long term SMP for the site (on-site capping);
- Provision of a Statutory Site Audit Report and Site Audit Statement by the Site Auditor (Mr Ian Gregson of GHD) confirming the suitability of the site for the university development. Note: Interim advice would be required for the staged construction process proposed.
- Notification is placed on the Section 10.7 planning certificate detailing the site has been remediated and is subject to a long term SMP (where applicable).
- The presence of ACM within soils and reference to the SMP is noted on the site asbestos register in accordance with relevant WHS regulations.

# 10. Remediation Strategy

## 10.1 Sequence of Remediation

The remediation strategy and requirements must be incorporated with the proposed development.

The following general methodology and sequence of activities is suggested:

1. Client / Contractor to obtain all necessary approvals and notifications for the works, including NSW Government / Council approvals and Site Auditor approval of this RAP;
2. Inception meeting between the client, contractor and environmental consultant to confirm responsibilities and procedures for remediation and construction;
3. Contractor to set up environmental controls and secure the site;
4. Contractor to complete demolition of buildings at each stage of demolition, remove concrete building slabs and allow inspection of the underlying ground surface by DP to assess the presence of any significantly contaminated soil / fill (ie soils with volatile hydrocarbon impact) which may affect the proposed on-site management remediation approach. A clearance report should be provided following demolition of each building;
5. Bulk excavation of excess fill / soil materials or geotechnically unsuitable materials for off-site disposal. Due to the variable nature of site filling, the following is recommended:
    - Confirmation of waste classification and possible presence of ‘hot-spots’ which may impact the classification;
    - Confirmation of disposal / re-use options with reference to NSW EPA waste classification guidelines or relevant resource recovery exemptions (where appropriate);
    - Appropriate removal / disposal of excess materials based on the classification in accordance with statutory and regulatory requirements;

- Filling and hot-spots (where present) should be carefully segregated to minimise the risk of cross-contamination with 'cleaner' materials;
- Pile spoil should be segregated and managed with due consideration to the waste classification of the spoil;
- Where possible, soils should be maintained on-site beneath site capping to minimise disposal costs.

6. If feasible, excavate / strip contaminated fill materials from landscape areas and temporarily stockpile within the proposed concrete pavement footprint for placement within pavement areas (subject to geotechnical suitability). Validate the stripped fill surface to confirm the appropriate removal of impacted filling. Over excavate the impacted fill to avoid re-contamination of soils within the landscape area footprint);
7. Continue excavation of landscape areas (where applicable) to design invert levels (ie to accommodate design imported soil profile) and stockpile separately to allow classification and assessment of re-use/disposal options;
8. Backfill landscape areas as required with imported VENM/ENM materials or relevant RRE/RRO materials or validated soils from on-site which are suitable for landscaping;
9. It is understood that validated demolition materials will be crushed on-site and re-used to reinstate site level where required. Appropriate sampling and testing on crushed materials will be required to confirm the suitability for reuse on-site. We understand that such materials will be utilised beneath site capping;
10. Trim / excavate the surface (as required) and/or place excavated impacted fill materials (including impacted stockpiled materials from landscape areas) within the pavement areas in order to achieve the final design surface level and maximise use of excess site soils (ie impacted soils) beneath concrete slabs/pavements. Due regard must be made to the geotechnical properties of the soils for placement within load bearing/pavement areas;
11. Co-ordinate excavations for service trenches and footings (or other underground installations) so that excess spoil (potentially impacted soils) can be utilised beneath capping if suitable. Impacted soils should not be re-used as backfill within service trenches below the water table as a precautionary measure. It is recommended that where practical the impacted fill materials are initially stripped and the natural surface validated so that underlying fill or natural materials proposed to be excavated can be re-used on-site within landscape areas or within trench backfill (if required). Where service easements are proposed to be re-instated with clean materials to minimise restrictions for future maintenance (ie proposed stormwater easement shown on the Cardno's Stormwater Diversion plans in Appendix C), the service trench sides and floor will need to be lined with a geotextile marker layer (as below) and backfilled with clean soils (as below). It is noted that capping of contaminated soils will not be conducted over this easement;
12. Prior to capping (including backfill of service trenches), the site surface must be surveyed by a registered surveyor to confirm that appropriate levels have been achieved (ie to allow design finished levels for pavements and a minimum 0.3 m capping in landscape areas). Construction of pavements and landscape areas must only commence once appropriate levels have been achieved;

13. Following survey confirmation of site levels, place a high visibility orange geofabric marker/separation layer (Bidim A34 or similar) over the impacted fill materials across the site. The geofabric should extend at least 0.5 m beyond the impacted filling along the sides of service trenches and validated landscape areas. Plastic sheeting could be utilised immediately beneath concrete floor slabs or concrete pavements in lieu of the geofabric. A validation inspection should be conducted by a suitably qualified environmental consultant to confirm that the geo-fabric marker layer covers the required footprint;
14. Import and construct the sealed pavement;
15. Repeat previous systematic survey to ensure that all areas are covered by the appropriate cap;
16. All imported fill materials and on-site crushed materials utilised during construction must be confirmed for use by a suitably qualified environmental consultant prior to use;
17. Excess filling excavated from within the site that cannot be accommodated beneath capping will require appropriate off-site disposal by a licenced contractor (refer to Section 10.2);
18. At the completion of capping, a validation inspection must be conducted by a suitably qualified environmental consultant to confirm that appropriate capping has been achieved in accordance with the RAP;
19. Upon the completion of capping, a suitably qualified environmental consultant must prepare a Remediation and Validation report. A long term SMP must then be prepared at the completion of construction for Site Auditor and Council review and approval, in order for Council to update the S10.7 planning certificate for the site. An important part of the ongoing management of the site will be the inspection and maintenance of the capping (ie pavement / soil capping in landscape areas (if required)).

Due regard must be given to the geotechnical requirements for site development so that site works are compatible with remediation requirements.

It is noted that the above procedure is not prescriptive and the contractor should confirm the construction process that will achieve the objectives of remediation in a practical and economical manner, with due regard to WHS. This procedure must be presented in the CEMP for the work.

Capping of impacted materials within landscape areas could also be considered as an alternative to complete removal and validation. If capping within landscape areas is required for construction, Steps 5 to 7 above would be replaced as follows:

1. Prepare landscape areas (garden beds) to accept nominal 300 mm of soil (VENM/ENM) as part of the management of landscape areas (ie outside the proposed concrete pavement areas);
2. Prior to capping, the site surface must be surveyed by a registered surveyor to confirm that appropriate levels have been achieved (ie to allow design finished levels for landscape areas to be achieved);
3. Following survey confirmation of site levels, place a high visibility orange geofabric marker/separation layer (Bidim A34 or similar) over the placed materials across the site;
4. Import and place approved fill material (VENM/ENM) over the landscaped areas to achieve a minimal 300 mm cap after construction;
5. Repeat previous systematic survey to ensure that all areas are covered by the appropriate cap.

A minimum capping of 300 mm is suggested for landscape areas with general ground cover (ie shallow root system). Increase capping thickness should be utilised where deep rooted vegetation is proposed (ie trees). Advice should be sought from the landscape designers regarding the required thickness of capping to support the root zone for vegetation within landscape areas. Landscape plans and specifications must be updated to reflect the remediation requirements.

Further assessment prior to construction is recommended to confirm the most economical and feasible remediation procedure in landscape areas (ie full removal and validation within landscape areas or on-site management (ie capping)). The landscape design (not completed at the time of preparing this RAP) must reflect the remediation method adopted (ie capping strategy).

### 10.1.1 Contingency Plan

If contaminated soil quantities are such that they cannot be accommodated beneath the concrete paved areas or 300mm thick VENM/ENM capping layer (landscape areas), the excess materials will require stockpiling, classification (if required) and off-site disposal to a licensed landfill (refer to Section 10.2).

If indications of gross soil contamination are observed on-site during remediation works (i.e. staining / odours etc.), the materials must be appropriately investigated by a suitably qualified environmental consultant and either managed on site (if appropriate) or disposed off-site to a licenced landfill following classification.

The CEMP must provide further details regarding contingency procedures, including incident management and unexpected finds protocol.

## 10.2 Disposal of Contaminated Materials

Any excess contaminated materials which cannot be accommodated beneath capping must be disposed of to an appropriately licensed landfill or re-used on another site under a general or specific resource recovery exemption (where possible).

Previous investigations (DP, 2020a) indicated the following:

- The majority of fill materials tested are classified as ‘General Solid Waste (non-putrescible)’ based on total and leachable (TCLP) concentrations. It is noted asbestos impacted soils would be classified as ’Special Waste (asbestos waste)’. Bonded asbestos materials were observed at the surface and within filling across the site. Building demolition waste was also present within filling across the site. As a result, the fill materials across the site are classified “asbestos waste” in the absence of further detailed assessment;
- Options for re-use of site materials under a general resource recover exemption are limited due to the presence of elevated contaminant concentrations and presence of asbestos within filling. Targeted removal of natural soils not significantly impacted by contamination as VENM or ENM could be considered subject to validation and additional targeted investigation and testing with reference to NSW EPA (2014a and 2014b). Ideally this should be conducted prior to construction. Validation of stripped surfaces (if conducted) would require an inspection, and sampling / testing for contaminants of concern on minimum 10 m x 10 m grid.

Excess materials should be assessed for beneficial off-site re-use or recycling (where possible) in order to minimise disposal costs.

Any materials which require off-site disposal must be classified in accordance with NSW EPA (2014a). The criteria for disposal in accordance with NSW EPA (2014a) are presented in Tables 3 and 4 below. In addition, asbestos contaminated soil/fill/sediment will require disposal to a licensed landfill as 'special waste' in accordance with NSW EPA (2014a).

**Table 3 – Landfill Disposal Criteria – Total Concentrations**

| CONTAMINANT THRESHOLD VALUES FOR CLASSIFYING WASTE BY CHEMICAL ASSESSMENT WITHOUT DOING THE LEACHING TEST (1) | | |
|---|---|---|
| Contaminant | Maximum Values of Total Concentration for Classification without TCLP | |
| | General Solid Waste CT1 (mg/kg) | Restricted Solid Waste CT2 (mg/kg) |
| Benzene | 10 | 40 |
| Toluene | 288 | 1152 |
| Ethyl Benzene | 600 | 2400 |
| Xylenes (total) | 1000 | 4000 |
| $C_6$-$C_9$ petroleum hydrocarbons | 650 | 2600 |
| $C_{10}$-$C_{36}$ petroleum hydrocarbons | 10 000 | 40 000 |
| Lead | 100 | 400 |
| Arsenic | 100 | 400 |
| Cadmium | 20 | 80 |
| Chromium (total) | 100 | 400 |
| Mercury | 4 | 16 |
| Nickel | 40 | 160 |
| Polycyclic Aromatic Hydrocarbons (total) | 200 | 800 |
| Benzo(a)pyrene | 0.8 | 3.2 |

Notes to Table 3:
Adopted from Table 1 – NSW EPA (2014a)

**Table 4 – Landfill Disposal Criteria – Leachable and Total Concentrations**

| LEACHABLE CONCENTRATION (TCLP) AND TOTAL CONCENTRATION (SCC) FOR CLASSIFYING WASTE BY CHEMICAL ASSESSMENT (1) | | | | |
|---|---|---|---|---|
| Contaminant | Maximum Values for Leachable Concentration and Total Concentration when used together | | | |
| | General Solid Waste | | Restricted Solid Waste | |
| | Leachable Concentration TCLP1 (mg/L) | Total Concentration SCC1 (mg/kg) | Leachable Concentration TCLP2 (mg/L) | Total Concentration SCC2 (mg/kg) |
| Benzene | 0.5 | 18 | 2 | 72 |
| Toluene | 14.4 | 518 | 57.6 | 2073 |
| Ethyl Benzene | 30 | 1080 | 120 | 4320 |
| Xylenes (total) | 50 | 1800 | 200 | 7200 |
| $C_6$-$C_9$ petroleum hydrocarbons(2) | N/A(2) | 650 | N/A(2) | 2600 |
| $C_{10}$-$C_{36}$ petroleum hydrocarbons(2) | N/A(2) | 10 000 | N/A(2) | 40 000 |
| Lead | 5 | 1500 | 20 | 6000 |
| Arsenic | 5 | 500 | 20 | 2000 |
| Cadmium | 1 | 100 | 4 | 400 |
| Chromium (total) | 5 | 1900 | 20 | 7600 |
| Mercury | 0.2 | 50 | 0.8 | 200 |
| Nickel | 2 | 1050 | 8 | 4200 |
| Polycyclic Aromatic Hydrocarbons (total) | N/A | 200 | N/A | 800 |
| Benzo(a)pyrene | 0.04 | 10 | 0.16 | 23 |

Notes to Table 4:

(1) Adopted from Table 2 – NSW EPA (2014a)

(2) Petroleum hydrocarbons are assessed only by total concentration (SCC1 or SCC2)

N/A – Not applicable

Classification of materials for off-site disposal will include inspection, sampling and analysis. The frequency of testing required for classification should be confirmed by a suitably qualified environmental consultant and will depend on the volume and consistency of the material and the results of previous testing.

Groundwater disposal (if required) must be conducted by a licensed contractor in accordance with statutory and regulatory requirements. Groundwater requiring off-site disposal is classed as Liquid Waste in accordance with NSW EPA (2014a).

Truck dispatch shall be logged and recorded by the contractor for each load leaving the site (refer to Section 10.4). A record of the truck dispatch will be provided to DP by the contractor. The waste tracking procedure should be confirmed by the OH due to the potential presence of bonded asbestos.

## 10.3 Stockpiling of Contaminated Materials

Where required, contaminated material shall be temporarily stockpiled at a suitable location(s) within the site.

All stockpiles of contaminated material shall be appropriately demarcated to clearly delineate their boundaries. Stockpiles shall be lightly conditioned by water sprinkler and covered by geotextile or similar cover to prevent dust blow. Geotextile silt fences or hay bales should be erected around each stockpile to prevent losses by surface erosion where required or sediment run-off. The location and quantity of stockpiled contaminated soils should be recorded by the contactor.

If temporary stockpiling is required following capping, stockpiles should be placed over plastic or concrete slabs to minimise cross-contamination with underlying soils. The footprint of such stockpiles should also be validated via inspection and testing (where required) for potential contaminants following removal as discussed in Section 11.3.

## 10.4 Loading and Transport of Contaminated Materials

Transport of contaminated material off the site shall be via a clearly demarcated haul route and this route exclusively shall be used for entry and egress of vehicles used to haul identified contaminated materials within and away from the site.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licences / permits, consents and approvals from NSW EPA and/or other Authorities to transport and dispose the waste materials according to the classification guidelines.

Details of all contaminated materials removed from the site shall be documented by the contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate). Such information must be provided to DP for reporting purposes. A site log / tracking sheets shall be maintained by the remediation contractor for stockpiles (numbered locations), to enable the tracking of disposed loads against on-site origin and location of the materials and corresponding (validation) sample numbers.

Measures shall be implemented to minimise the potential for contaminated material is spilled onto public roadways or tracked off-site on vehicle wheels. Such measures could include the deployment of a vehicle washing / cleaning facility, which should be placed at a location before the egress point of the site. The facility shall be able to handle all vehicles and plant operating on site (if required). Residue from the cleaning facility will be deemed contaminated unless shown by validation to be below RAC criteria.

The proposed waste transport route should be notified to the local Council and truck dispatch shall be logged and recorded by the contractor for each load leaving the site. The waste tracking procedure should be confirmed by the environmental consultant.

## 10.5 Imported Fill

Imported fill used to reinstate site excavations or raise site levels (where required), or utilised for the proposed development (ie landscape areas, pavement materials etc) must be classified as VENM or ENM, or comply with an appropriate / relevant resource recovery order / exemption (RRO / RRE). The materials must be accompanied by a certificate from the supplier including suitable analytical testing that is representative of the materials in question (other than material supplied directly from a licensed VENM quarry), otherwise detailed assessment (including analysis of representative samples) will be required prior to use on-site. Imported soils must also meet the adopted RAC. Soil proposed for importation must be confirmed to be VENM / ENM or comply with a relevant RRO / RRE and assessed to be “fit for purpose” prior to delivery to the site.

## 10.6 Geotechnical Considerations

The site stripping, excavation and the placement and compaction of fill materials must be carried out with due consideration of geotechnical requirements for development. Deleterious inclusions such as organics, timber, metal, concrete (>200 mm) must be segregated from filling that may be used as engineered fill (ie for support of buildings or pavements).

Fill materials that will support structural loads, pavement, services or form structural backfill, must be placed and compacted to a suitable geotechnical specification that takes account of the intended purpose of the fill.

Specific advice must be sought from the geotechnical and structural designers for the project.

## 10.7 Unexpected Finds Protocol

The results of previous assessments at the site indicate the presence of PAH, TRH (long-chained), heavy metal and bonded asbestos contamination within filling / soil across the site. While statistical analysis and consideration of the ecological setting and proposed development indicates that remediation for the identified PAH, TRH and heavy metal impacts are not warranted, due to the historical demolition activities and the presence of uncontrolled filling at the site, there is potential for additional contamination within site soils (including contaminants mentioned above) which may be considered ‘hot

spots' with reference to NEPC (2013). Contingency procedures are required should additional potentially contaminated soils be identified during site development.

The following general procedures are suggested for the assessment and management of potentially impacted filling / soils during remediation / earthworks. Based on the results of previous assessment, soils/filling may be potentially impacted by petroleum hydrocarbons, heavy metals, PAH, asbestos:

- Excavation, handling, loading and transport of contaminated materials must be undertaken by a licensed contractor in accordance with the appropriate regulatory approvals and legislative requirements;
- The progress of site excavations during construction must be inspected by the contractor during earthworks, and periodically by the contaminated lands consultant (ie DP). Potential soil contamination may include stained soils, odorous soils, soils containing excessive fibro fragments, soils containing slag/ash products and building rubble (ie bricks, tiles, concrete, timber etc);
- If additional potentially contaminated soils are encountered (ie visual or olfactory indication of contamination), excavation of filling should cease, and the extent of the affected filling should be assessed by DP;
- The affected soils may need to be segregated based on visual/olfactory observations, and stockpiled for further assessment, alternatively, the soils may be suitable to remain on-site beneath the cap;
- If the assessment of impacted materials indicates that the materials are not suitable to remain on-site, the materials must be classified for disposal to an appropriately licensed landfill with reference to the NSW EPA (2014a);
- The affected area must be stripped and validated by DP;
- Excavation in the affected area cannot recommence until the validation testing indicates the absence of gross impact and no visual or olfactory indicators of contamination);
- Licensed contractor to load classified materials directly into appropriate trucks for transport and disposal to a licensed facility (Note: waste classification is required prior to off-site disposal).

# 11. Sample Collection and Analysis

## 11.1 Sample Collection and Handling

### 11.1.1 Soil

Soil sampling will be directly from the exposed surface of excavation, or, in the case of stockpiles, from various depths between the surface and the base. Sampling data shall be recorded to comply with routine Chain of Custody (COC) requirements.

The general sampling, handling, transport and tracking procedures comprises:

- The use of stainless steel sampling equipment;
- The use of disposable gloves for each sampling event;

- Washing of all sampling equipment in contact with the sample, in a 3% solution of phosphate free detergent (Decon 90) then rinsing with distilled water prior to each sample being collected;
- Transfer of the sample immediately into new glass jars;
- Collection of 10% replicate samples for QA/QC purposes;
- Collection of replicate soil samples in zip-lock plastic bags for PID screening;
- Labelling of the sample containers with individual and unique identification including Project Number and Sample Number;
- Placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- Use of chain of custody documentation so that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to hand-over to the laboratory.

### 11.1.2 Seepage / Groundwater

The general sampling, handling, transport and tracking procedures for the collection and analysis of a seepage/groundwater sample from water within the excavation (if required) comprises:

- Collection of seepage/groundwater 'grab' sample using a long-handled 'swing-sampler' fitted with new laboratory prepared containers for analysis;
- The use of disposable gloves for each sampling event;
- Collection of 10% replicate samples for QA/QC purposes;
- Collection of replicate water samples in a laboratory prepared jar for field screening of the groundwater with a PID;
- Labelling of the sample containers with individual and unique identification including Project Number and Sample Number;
- Placement of the containers into a chilled, enclosed and secure container for transport to the laboratory; and
- Use of COC documentation so that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to hand-over to the laboratory.

## 11.2 Sample Holding Times

The maximum sample holding times are as follows:

**Soil**

- Metals – 6 months (if required);
- TRH/BTEX – 14 days;
- PAH – 14 days, and 40 days following extraction (if required);
- OCP/OPP – 14 days, and 40 days following extraction (if required);
- Asbestos – Not applicable.

**Groundwater/Seepage**

- Metals – 6 months (if required);
- TRH/BTEX – 14 days;
- PAH – 14 days, and 40 days following extraction (if required).

All samples must be collected in appropriate containers and stored at 4°C or below.

## 11.3 Validation Sample Analysis

Where required, analysis for the validation of stripped/excavated contaminated soils within landscape areas, base of bulk excavations or the stormwater easement must comprise the following:

- Total Recoverable hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Asbestos (WA Department of Health – 500 mL).

The analytical programme will be reviewed following excavation, segregation and sampling to confirm analytes for testing. Leachability (TCLP) analysis may be required for stockpile samples if total contaminant levels are found to exceed 'General Solid Waste' Criteria.

## 11.4 Waste Classification Sample Analysis

Analysis for waste classification must comprise the following target contaminants, based on previous work at the site:

- Total Recoverable hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Asbestos Identification testing.

Additional analytes (ie foreign materials, pH, EC, etc) may be required if assessment against a general RRO is proposed.

The analytical programme will be reviewed following inspection and sampling to confirm analytes for testing. Leachability (TCLP) analysis may be required if total contaminant levels are found to exceed 'General Solid Waste' criteria.

### 11.5 Imported Fill

Any materials which are imported onto the site (eg to backfill excavations/service trenches, utilised as bedding materials for pavements etc) must be classified as VENM or ENM or comply with a relevant RRE / RRE, or a commercially available and certified product (suitable for on-site use), and must be accompanied by a certificate from the supplier including suitable analytical testing that is representative of the materials in question (other than material supplied directly from a licensed VENM quarry). . Otherwise detailed assessment (including analysis of representative samples) will be required prior to use on site. Imported soils must also meet the adopted RAC. An appropriate report must be made available to the environmental consultant for review and approval prior to the importation of the material.

## 12. Quality Assurance Plan

### 12.1 Field Quality Assurance

Sampling accuracy and precision should be maintained through the analysis of 10% field duplicate/replicate samples.

Appropriate sampling procedures should be undertaken to minimise potential for cross contamination, for example:

- Standard operating procedures are followed;
- Site safety plans are developed prior to commencement of works;
- Duplicate or replicate field samples are collected and analysed;
- Equipment rinsate samples are analysed as part of the QA/QC programme;
- Samples are stored under secure, temperature controlled conditions;
- Chain of custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory.

### 12.2 Laboratory Quality Assurance and Quality Control

DP's preferred laboratory routinely undertakes in-house QA/QC procedures involving the routine testing of:

- Reagent blanks;
- Spike recovery analysis;
- Laboratory duplicate analysis;
- Analysis of control standards;
- Calibration standards and blanks;
- Statistical analysis of QC data.

## 12.3 Data Quality Indicators

Based on the analysis of quality control samples i.e. duplicates/replicates and in-house laboratory QA/QC procedures, the following data quality indicators have been assigned for the validation testing:

- Conformance with specified holding times;
- Accuracy of spiked samples within the laboratory's acceptable range (typically 70% to 130% for inorganic contaminants and greater for some organic contaminants);
- Field and laboratory duplicates and replicates samples will have a precision average of +/- 50% relative per cent difference (RPD). Elevated RPDs may be present due to heterogeneity of materials or where concentrations detected are <10 x LOR;
- Rinsate samples will show that the sampling equipment is free of introduced contaminants (i.e. the analytes within the normal range for deionised water);
- Field duplicates/replicates will be collected at a frequency of 10% of all samples, and rinsate samples of field equipment will be collected at one per day of sampling.

An assessment of the overall data quality will be presented in the final validation report.

## 12.4 Validation Reporting

A validation report will be prepared by the environmental consultant with reference to the NSW EPA Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA, 2011), NSW EPA Guidelines for the NSW Site Auditor Scheme (NSW EPA, 2017)and other appropriate guidance documentation. An important part of site validation (for on-site capping) will be the inspection to confirm that appropriate capping has been achieved in accordance with the RAP.

The report shall be submitted to the client for submission to the Site Auditor and Council at the completion of the remediation works program. The validation report shall confirm that the site has been remediated to a suitable standard for the proposed university development. It is noted that due to the staged construction program proposed, interim validation reports may be required for each stage.

The validation report should include details of the total volume of contaminated materials removed from site (if any), indicate the final disposal destination of the materials removed from site (if any), the final location and depth of materials retained on site, present details of the capping procedure and final capping depths, present detailed analytical results, and provide comment on the suitability of the site for the proposed university development.

Upon the completion of remediation and validation works and construction, a SMP will be drafted for long-term management of capped materials on-site (ie measures to reduce the likelihood of future disturbance, and procedures for handling/disposal in the event that identified contaminated materials are disturbed). Again, due to the staged construction program proposed, interim SMP reports may be required for each stage.

The SMP will promote awareness of the contamination management and the requirement of avoiding disturbance to the capping. The SMP will require review and approval by the Auditor and regulator who will also organise for the placement of an appropriate notification on the S10.7 certificate for the site. The SMP and presence of ACM within soils across the site will also be notified in the site asbestos register in accordance with the relevant WHS regulations.

# 13. Environmental Management Plan (During Construction)

## 13.1 Introduction

The contractor must undertake the work with due regard to the minimisation of environmental effects and to meet all statutory and regulatory requirements.

The contractor shall have in place a CEMP so that work on the site complies with, but not limited to, the requirements of the following legislation:

- Protection of the Environment Operations Act;
- Contaminated Land Management Act;
- Dangerous Goods Act;
- Construction Safety Act;
- Work Health and Safety Act (SafeWork NSW);
- Council Development Approval Conditions.

The contractor shall also be responsible that the site works comply with the following conditions:

- Wastes generated at the site are disposed in an appropriate manner;
- Fugitive dust leaving the confines of the site is minimised;
- No water containing any suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- Vehicles shall be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas;
- Noise and vibration levels at the site boundaries comply with the legislative requirements.

Asbestos materials have been associated with various human respiratory diseases. The risk of contracting these diseases from contact with asbestos depends entirely on the fibres becoming airborne. It is important during disturbance of potential asbestos impacted soils that the potential for generating airborne asbestos fibres should be minimised. Moreover, levels of airborne asbestos fibres immediately outside the works area should be maintained to within the acceptable background level (ie <0.01 fibre/mL). As asbestos material identified on the site was generally in the form of fragments there is a low risk of asbestos fibres becoming airborne. Appropriate air monitoring should be conducted by the OH during remediation in the event that ACM are encountered during development.

In order to achieve a minimisation of environmental effects, the following measures are recommended, and should be adopted by the appointed contractor.

The contractor's CEMP is to include:

- Contingency plans to respond to site incidents;
- SMP for the operation phase of remedial works;
- A remedial schedule and hours of operation (which will be subject to development consent conditions);
- Details of relevant contacts;
- Requirements outlined in NCC Technical Manual: Contaminated Land Management (June 2012);
- Procedure(s) for dealing with deleterious materials that may affect containment of materials and/or use as fill (as per Section 10.7);
- Incident management/emergency response procedures;
- Any community consultation requirements.

At commencement of remediation works, interim measures must be adopted to manage possible human-health and environmental impacts in the event that ACM is observed at the surface (i.e. prior to full scale construction). Such measures could include use of spray / sprinklers to prevent dust blow or temporary covers. Requirements for interim control measures should be confirmed with the OH.

In order to achieve a minimisation of environmental effects, the following measures are recommended, and should be adopted by the appointed contractor as part of the contractors Environmental Management Plan.

## 13.2 Traffic Management

All vehicular traffic shall use only routes approved by Council, to and from the selected landfill where off-site disposal is undertaken. All loads shall be tarpaulin covered and lightly wetted to minimise the potential for materials or dust are dropped or deposited outside or within the site. The proposed landfill should be consulted for any additional requirements.

Each vehicle that has trafficked potentially impacted site soils within the site shall be inspected for cleanliness before being logged out as clean (wheels and chassis), or hosed down into a wheel wash or wash down bay until designated as clean when exiting the site (if required).

Wheel wash silt residues should be collected periodically and either returned to the excavation area or included in the remediation stockpile. Such material will be treated as contaminated unless analysis proves otherwise.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent or approvals to dispose the waste materials according to the waste classification.

Waste tracking must be conducted by the licensed contractor in accordance with regulatory requirements. Details of all materials removed from the site shall be documented by a contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation (where appropriate) provided to the environmental consultant responsible for site validation. A site log shall be maintained by the contractor to track disposed loads against on-site origin and location of the materials.

Truck dispatch shall be logged and recorded by the contractor for each load leaving the site. A record of the truck dispatch must be provided to the environmental consultant responsible for site validation by the contractor.

Similarly tracking and documentation of all on-site movements of material must be maintained by the contractor.

## 13.3 Excavations

Records of all excavations and stockpile locations should be maintained. A site diary should also be maintained by the contractor to record daily progress, abnormal occurrences, incidents, and truck movements.

Contaminated material should be stockpiled at suitable locations within the site. All temporary stockpiles of contaminated material shall be secured and demarcated to clearly delineate their boundaries.

All excavations shall be made with due regard to the stability of adjacent footings and structures. It will be the contractor's responsibility to provide adequate battering, shoring and/or underpinning to protect adjacent structures (if required).

No person shall be permitted to enter an unsupported excavation where it is more than 1.5 m deep or where it is considered to be unstable, irrespective of depth.

Records of all imported filling and placement must also be maintained by the contractor.

## 13.4 Stormwater Management and Control

Appropriate measures shall be taken to minimise the potential for potentially contaminated water or sediments to leave the site. Such measures could include:

Appropriate construction of stockpiles (if required), with regular checks for integrity and repairs if / when required;

- Construction of diversion bunds to divert stormwater from contaminated areas and contaminated soil stockpiles;
- Provision of sediment traps including geotextiles or hay bales;
- Construction of sediment control basins (if required);
- Staging of works to minimise the area of disturbance at any one time.

Discharge of any waters must meet the consent conditions from the appropriate authority. This should be verified by sampling and analyses undertaken by the contractor.

For example, if excavations fill with water during validation works (ie due to rainfall), the water will require analysis to determine appropriate options for discharge (ie disposal to stormwater, sewer or collection by a licensed contractor).

### 13.5 Control of Dust and Odour

Control of dust and odour during the course of the remediation works shall be maintained by the contractor and may include, but not necessarily be limited to, the following:

- The use of a water cart, as and when appropriate, to eliminate wind-blown dust;
- Use of sprays/sprinklers to prevent dust blow from stockpiles;
- Covering of stockpiles with plastic sheeting or geotextile membranes;
- Restriction of stockpile heights to 2 m above surrounding site level;
- Ceasing works during periods of inclement weather such as high winds or heavy rain;
- Regular checking of the fugitive dust and odour issues. Undertake immediate remediation measures to rectify any cases of excessive dust or odour;
- Provision of temporary capping over site soils such as the contractor staging area.

### 13.6 Noise Control

Noise and vibration will be restricted to reasonable levels. All plant and machinery used on site should not breach statutory noise levels. Working hours will be restricted to those specified by Council.

## 14. Work Health and Safety

All site work must be undertaken in a controlled and safe manner with due regard to potential hazards, training and safe work practices. The practices outlined should generally comply with the WHS policies and regulations specified by the relevant Authorities.

All personnel on site should be required to wear the following protection as a minimum:

- Steel-capped boots;
- Safety glasses or safety goggles with side shields meeting AS 1337 requirements (as necessary);
- Hard hat meeting AS 1801 requirements;
- Hearing protection meeting AS 1270 requirements when working around machinery or plant equipment if noise levels exceed exposure standards.

In the event that personnel are required to work in areas of potential contact with ACM, the following protection will be required in accordance with the Worksafe NSW: Asbestos – Code of Practice and Guidelines Notes:

- Disposable coveralls to prevent contact with asbestos materials if large volumes of asbestos material are present;
- Breathing apparatus fitted with a Class P2 filter;
- Steel-capped boots (laceless unless boot covers are worn);
- nitrile work gloves meeting AS 2161 requirements or heavy duty gauntlet gloves;
- Safety glasses or safety goggles with side shields meeting AS 1337 requirements (as necessary);
- Hard hat meeting AS 1801 requirements;
- Hearing protection meeting AS 1270 requirements when working around machinery or plant equipment if noise levels exceed exposure standards.

Excavation, handling, stockpiling, transport etc. of materials containing asbestos must be undertaken by a licenced contractor in accordance with the SafeWork NSW: Asbestos – Code of Practice and Guidelines Notes, and the relevant statutory requirements such as Part 7 of the Protection of the Environment Operations (Waste) Regulation 2014. Based on the results of the previous investigations, the presence of asbestos materials will comprise bonded ACM (ie fibro fragments).

The contractor shall prepare a project-specific environmental management and WHS plans to supplement measures presented in this RAP.

## 15. References

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NEPC (2013), *National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013*, National Environment Protection Council;

NSW EPA (1998), *Managing Land Contamination, Planning Guidelines, SEPP55 – Remediation of Land*, NSW Environment Protection Authority.

NSW EPA (2011), *Contaminated Sites, Guidelines for Consultants Reporting on Contaminated Sites*, NSW Environment Protection Authority.

NSW EPA (2014a), *Waste Classification Guidelines – Part 1: Classifying waste*, NSW Environment Protection Authority.

NSW EPA (2014b), *Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The excavated natural material order 2014*, NSW Environment Protection Authority.

NSW EPA (2017), *Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, NSW Environment Protection Authority.

Prensa (2016), *Detailed Site Investigation, 9 Church St, Newcastle, NSW 2300*, Prensa Pty Ltd.

WA DoH (2009), *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*, Western Australia Department of Health.

## 16. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at 9 Church Street, Newcastle with reference to DP's proposal NCL190520.P.001.Rev1 dated 16 September 2019 and email variation of 12 November 2019 and acceptance received from Sita Vasanthakumar of Built Pty Limited dated 30 October 2019 and 15 November 2019 on behalf of Nihon Daigaku Australia Newcastle Pty Ltd. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Nihon Daigaku Australia Newcastle Pty Ltd and Built Pty Limited for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during the previous investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility. Due to time constraints, 'post-demolition' investigations were undertaken during the course of site demolition as requested by the developer/client. Parts of the site were therefore not accessible for inspection/investigation. Further inspection/investigation will therefore be conducted during site remediation to confirm site conditions.

Asbestos has been detected by observation and by laboratory analysis, either on the surface of the site, or in filling materials at the test locations sampled and analysed. Building demolition materials, such as concrete, brick, tile, wood, glass, metal and bitumen, were located in below-ground filling, and these are considered as indicative of the possible presence of hazardous building materials (HBM), including asbestos.

Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to budget constraints (as discussed above), or to parts of the site being inaccessible and not available for inspection/sampling, or to vegetation preventing visual inspection and reasonable access. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

The remediation strategy adopted in the RAP was based on the results of site investigations and confirmed through discussions with the developer/client who considered practical, cost-effective and time-effective remediation options for the site.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the (environmental / groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

**Douglas Partners Pty Ltd**

# Appendix A

About This Report
Table 10: Results of Chemical Analysis of Soil (Contamination) (DP, 2020a)
Table 11: Results of Chemical Analysis of Soil (Waste Classification) (DP, 2020a)
Table 12: Results of Leachability Analysis (DP, 2020a)

# About this Report

Douglas Partners

## Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

## Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

## Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

## Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

## Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

# *About this Report*

## Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

## Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

## Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

## Table 10: Results of Chemical Analysis of Soil (Contamination)

| Analyte | Units | PQL | NSW EPA 2014 - General Solid Waste CT1 (No TCLP) | NSW EPA 2014 - Restricted Solid Waste CT2 (No TCLP) | CRC Care Direct Contact HSL-B | CRC Care Direct Contact Intrusive Maintenance Worker | CRC Care Intrusive MW Soil HSL Vapour I, Sand 0-2m | 2-4m | >4m | NEPM 2013 Table 1A(1) HILs Res B Soil | NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m | 1-2m | 2-4m | >4m | NEPM 2013 EILs Res/Open Space Aged | NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[1] | NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coal Tar Identification | - | | | | | | | | | | | | | | | | |
| **Metals** | | | | | | | | | | | | | | | | | |
| Aluminium | mg/kg | 10 | | | | | | | | | | | | | | | |
| Antimony | mg/kg | 7 | | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 4 | 100 | 400 | | | | | | 500 | | | | | 100 | | |
| Boron | mg/kg | 3 | | | | | | | | 40000 | | | | | | | |
| Cadmium | mg/kg | 0.4 | 20 | 80 | | | | | | 150 | | | | | | | |
| Chromium (III+VI) | mg/kg | 1 | 100 | 400 | | | | | | 500 | | | | | 190 | | |
| Cobalt | mg/kg | 1 | | | | | | | | 600 | | | | | | | |
| Copper | mg/kg | 1 | | | | | | | | 30000 | | | | | 55 | | |
| Iron | mg/kg | 10 | | | | | | | | | | | | | | | |
| Lead | mg/kg | 1 | 100 | 400 | | | | | | 1200 | | | | | 1100 | | |
| Magnesium | mg/kg | 10 | | | | | | | | | | | | | | | |
| Manganese | mg/kg | 1 | | | | | | | | 14000 | | | | | | | |
| Mercury | mg/kg | 0.1 | 4 | 16 | | | | | | 120 | | | | | | | |
| Nickel | mg/kg | 1 | 40 | 160 | | | | | | 1200 | | | | | 9 | | |
| Selenium | mg/kg | 2 | 20 | 80 | | | | | | 1400 | | | | | | | |
| Tin | mg/kg | 1 | | | | | | | | | | | | | | | |
| Zinc | mg/kg | 1 | | | | | | | | 60000 | | | | | 150 | | |
| **TRH** | | | | | | | | | | | | | | | | | |
| C10-C16 | mg/kg | 50 | | | 4200 | 62000 | | | | | | | | | | | **1000** |
| C16-C34 | mg/kg | 100 | | | 5800 | 85000 | | | | | | | | | | 300 | **2500** |
| C34-C40 | mg/kg | 100 | | | 8100 | 120000 | | | | | | | | | | 2800 | **10000** |
| F2-NAPHTHALENE | mg/kg | 50 | | | | | NL | NL | NL | | 110 | 240 | 440 | NL | | 120 | |
| C6 - C9 | mg/kg | 25 | 650 | 2600 | | | | | | | | | | | | | |
| C10 - C14 | mg/kg | 50 | | | | | | | | | | | | | | | |
| C15 - C28 | mg/kg | 100 | | | | | | | | | | | | | | | |
| C29-C36 | mg/kg | 100 | | | | | | | | | | | | | | | |
| +C10 - C36 (Sum of total) | mg/kg | | 10000 | 40000 | | | | | | | | | | | | | |
| C10 - C40 (Sum of total) | mg/kg | 50 | | | | | | | | | | | | | | | |
| C6-C10 less BTEX (F1) | mg/kg | 25 | | | | | NL | NL | NL | | 45 | 70 | 110 | 200 | | 180 | |
| C6-C10 | mg/kg | 25 | | | 5600 | 82000 | | | | | | | | | | | **700** |
| **BTEX** | | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.2 | 10 | 40 | 140 | 1100 | 77 | 160 | NL | | 0.5 | 0.5 | 0.5 | 0.5 | | 50 | |
| Ethylbenzene | mg/kg | 1 | 600 | 2400 | 5900 | 85000 | NL | NL | NL | | 55 | NL | NL | NL | | 70 | |
| Toluene | mg/kg | 0.5 | 288 | 1152 | 21000 | 120000 | NL | NL | NL | | 160 | 220 | 310 | 540 | | 85 | |
| Xylene (m & p) | mg/kg | 2 | | | | | | | | | | | | | | | |
| Xylene (o) | mg/kg | 1 | | | | | | | | | | | | | | | |
| Xylene Total | mg/kg | 3 | 1000 | 4000 | 17000 | 130000 | NL | NL | NL | | 40 | 60 | 95 | 170 | | 105 | |
| **MAH** | | | | | | | | | | | | | | | | | |
| 1,2,4-trimethylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,3,5-trimethylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Isopropylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| n-butylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| n-propylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| p-isopropyltoluene | mg/kg | 1 | | | | | | | | | | | | | | | |
| sec-butylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Styrene | mg/kg | 1 | 60 | 240 | | | | | | | | | | | | | |
| tert-butylbenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| **Chlorinated Hydrocarbons** | | | | | | | | | | | | | | | | | |
| 1,1,1,2-tetrachloroethane | mg/kg | 1 | 200 | 800 | | | | | | | | | | | | | |
| 1,1,1-trichloroethane | mg/kg | 1 | 600 | 2400 | | | | | | | | | | | | | |
| 1,1,2,2-tetrachloroethane | mg/kg | 1 | 26 | 104 | | | | | | | | | | | | | |
| 1,1,2-trichloroethane | mg/kg | 1 | 24 | 96 | | | | | | | | | | | | | |
| 1,1-dichloroethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,1-dichloroethene | mg/kg | 1 | 14 | 56 | | | | | | | | | | | | | |
| 1,1-dichloropropene | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,2,3-trichloropropane | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,2-dibromo-3-chloropropane | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,2-dichloroethane | mg/kg | 1 | 10 | 40 | | | | | | | | | | | | | |
| 1,2-dichloropropane | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,3-dichloropropane | mg/kg | 1 | | | | | | | | | | | | | | | |
| 2,2-dichloropropane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Bromochloromethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Bromodichloromethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Bromoform | mg/kg | 1 | | | | | | | | | | | | | | | |
| Carbon tetrachloride | mg/kg | 1 | 10 | 40 | | | | | | | | | | | | | |
| Chlorodibromomethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Chloroethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Chloroform | mg/kg | 1 | 120 | 480 | | | | | | | | | | | | | |
| Chloromethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| cis-1,2-dichloroethene | mg/kg | 1 | | | | | | | | | | | | | | | |
| cis-1,3-dichloropropene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Dibromomethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Hexachlorobutadiene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Trichloroethene | mg/kg | 1 | 10 | 40 | | | | | | | | | | | | | |
| Tetrachloroethene | mg/kg | 1 | 14 | 56 | | | | | | | | | | | | | |
| trans-1,2-dichloroethene | mg/kg | 1 | | | | | | | | | | | | | | | |
| trans-1,3-dichloropropene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Vinyl chloride | mg/kg | 1 | 4 | 16 | | | | | | | | | | | | | |
| **Halogenated Hydrocarbons** | | | | | | | | | | | | | | | | | |
| 1,2-dibromoethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Bromomethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Dichlorodifluoromethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| Trichlorofluoromethane | mg/kg | 1 | | | | | | | | | | | | | | | |
| **Halogenated Benzenes** | | | | | | | | | | | | | | | | | |
| 1,2,3-trichlorobenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,2,4-trichlorobenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,2-dichlorobenzene | mg/kg | 1 | 86 | 344 | | | | | | | | | | | | | |
| 1,3-dichlorobenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| 1,4-dichlorobenzene | mg/kg | 1 | 150 | 600 | | | | | | | | | | | | | |
| 2-chlorotoluene | mg/kg | 1 | | | | | | | | | | | | | | | |
| 4-chlorotoluene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Bromobenzene | mg/kg | 1 | | | | | | | | | | | | | | | |
| Chlorobenzene | mg/kg | 1 | 2000 | 8000 | | | | | | | | | | | | | |
| Hexachlorobenzene | mg/kg | 0.1 | | | | | | | | 15 | | | | | | | |
| **Solvents** | | | | | | | | | | | | | | | | | |
| Cyclohexane | mg/kg | 1 | | | | | | | | | | | | | | | |
| **PAH/Phenols** | | | | | | | | | | | | | | | | | |
| Total Positive PAHs | mg/kg | 0.05 | 200 | 800 | | | | | | 400 | | | | | | | |
| Acenaphthene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Acenaphthylene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Anthracene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Benz(a)anthracene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Benzo(a) pyrene | mg/kg | 0.05 | 0.8 | 3.2 | | | | | | | | | | | | 33 | |
| Benzo(a)pyrene TEQ calc (zero) | mg/kg | 0.5 | | | | | | | | 4 | | | | | | | |
| Benzo(a)pyrene TEQ calc(half) | mg/kg | 0.5 | | | | | | | | 4 | | | | | | | |
| Benzo(a)pyrene TEQ calc(PQL) | mg/kg | 0.5 | | | | | | | | 4 | | | | | | | |
| Benzo(b,j+k)fluoranthene | mg/kg | 0.2 | | | | | | | | | | | | | | | |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Chrysene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Dibenz(a,h)anthracene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Fluoranthene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Fluorene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Naphthalene | mg/kg | 0.1 | | | 2200 | 29000 | NL | NL | NL | | 3 | NL | NL | NL | 170 | | |
| Phenanthrene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Phenolics Total | mg/kg | 5 | 288 | 1152 | | | | | | 130 | | | | | | | |
| Pyrene | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| **Polychlorinated biphenyls** | | | | | | | | | | | | | | | | | |
| PCBs (Sum of total) | mg/kg | 0.1 | 49.9999 | 49.9999 | | | | | | 1 | | | | | | | |
| Arochlor 1016 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Arochlor 1221 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Arochlor 1232 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Arochlor 1242 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Arochlor 1248 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Arochlor 1254 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Arochlor 1260 | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| **Organochlorine pesticides** | | | | | | | | | | | | | | | | | |
| Endosulfan | mg/kg | | 60 | 240 | | | | | | 400 | | | | | | | |
| 4,4-DDE | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| a-BHC | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Aldrin | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Aldrin + Dieldrin | mg/kg | | | | | | | | | 10 | | | | | | | |
| b-BHC | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Chlordane (cis) | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Chlordane (trans) | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| d-BHC | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| DDD | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| DDT | mg/kg | 0.1 | | | | | | | | | | | | | 180 | | |
| DDT+DDE+DDD | mg/kg | 0.1 | | | | | | | | 600 | | | | | | | |
| Dieldrin | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Endosulfan I | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Endosulfan II | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Endosulfan sulphate | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Endrin | mg/kg | 0.1 | | | | | | | | 20 | | | | | | | |
| Endrin aldehyde | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| g-BHC (Lindane) | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Heptachlor | mg/kg | 0.1 | | | | | | | | 10 | | | | | | | |
| Heptachlor epoxide | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Methoxychlor | mg/kg | 0.1 | | | | | | | | 500 | | | | | | | |
| **Organophosphorous Pesticides** | | | | | | | | | | | | | | | | | |
| Azinophos methyl | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Bromophos-ethyl | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Chlorpyrifos | mg/kg | 0.1 | 4 | 16 | | | | | | 340 | | | | | | | |
| Chlorpyrifos-methyl | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Diazinon | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Dichlorvos | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Dimethoate | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Ethion | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Fenitrothion | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Malathion | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Parathion | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| Ronnel | mg/kg | 0.1 | | | | | | | | | | | | | | | |
| **Pesticides** | | | | | | | | | | | | | | | | | |
| Moderately Harmful Pesticides (total) | mg/kg | | 250 | 1000 | | | | | | | | | | | | | |
| Pesticides (total, NSW Waste 2014) | mg/kg | | | | | | | | | | | | | | | | |
| Scheduled chemicals (NSW Waste 2014) | mg/kg | | 49.999 | 49.999 | | | | | | | | | | | | | |
| **Asbestos** | | | | | | | | | | | | | | | | | |
| Asbestos Identification | g/kg | 0.1 | | | | | | | | D | | | | | | | |

| Field_ID | 201/0.9-1.2 | 201/7.9 | 202/4.8 | 202/7.0 | 203/0-0.05 | 203/0.5 | D3-11/12/19 | MS4 / 0.02 | MS4 / 0.2 | F1 | F2 | 301/0.05 | 301/0.2 | 301/0.4 | D3 - 3-3-20 | T2 -3-3-20 | 301/0.7 | 302/F1 | 302/0.3 | 303/0.2 | 304/0.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LocCode | 201 | 201 | 202 | 202 | 203 | 203 | 203 | MS4 | MS4 | F1 | F2 | 301 | 301 | 301 | 301 | 301 | 301 | 302 | 302 | 303 | 304 |
| Fill (F) / Natural (N) | F | N | N | N | Asphalt | N | N | Asphalt | F | Material | Material | F | F | F | F | F | N | F | F | F | F |
| Sample Depth | 0.9-1.2 | 7.9 | 4.8 | 7 | 0-0.05 | 0.5 | 0.5 | 0.02 | 0.2 | Surface | Surface | 0.05 | 0.2 | 0.4 | 0.4 | 0.4 | 0.7 | 0.5 | 0.3 | 0.2 | 0.2 |
| Sample Date | 12/12/2019 | 12/12/2019 | 11/12/2019 | 11/12/2019 | 11/12/2019 | 11/12/2019 | 11/12/2019 | 19/11/2019 | 19/11/2019 | 22/11/2019 | 22/11/2019 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 |
| Coal Tar Identification | - | - | - | - | ND | - | - | ND | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Metals** | | | | | | | | | | | | | | | | | | | | | |
| Aluminium | 5000 | 7000 | 9000 | 8900 | - | 7000 | 6400 | - | - | - | - | 5000 | 5400 | 3300 | 2700 | 3320 | 1400 | - | 3400 | 11000 | 2600 |
| Antimony | <7 | <7 | <7 | <7 | - | <7 | <7 | - | - | - | - | <7 | <7 | <7 | <7 | <5 | <7 | - | <7 | <7 | <7 |
| Arsenic | <4 | 5 | 10 | <4 | - | 24 | 14 | - | <4 | - | - | <4 | <4 | <4 | <4 | <5 | <4 | - | <4 | 5 | <4 |
| Boron | <5 | <3 | <3 | <3 | - | <3 | <3 | - | - | - | - | 5 | <3 | <3 | <3 | <50 | <3 | - | <3 | <3 | <3 |
| Cadmium | <0.4 | <0.4 | <0.4 | <0.4 | - | <0.4 | 2 | - | <0.4 | - | - | 1 | 1 | <0.4 | <0.4 | <1 | <0.4 | - | <0.4 | <0.4 | <0.4 |
| Chromium (III+VI) | 4 | 9 | 12 | 11 | - | 7 | 10 | - | 24 | - | - | 21 | 15 | 7 | 5 | 7 | 2 | - | 4 | 12 | 4 |
| Cobalt | 1 | 4 | <1 | 2 | - | 1 | 3 | - | - | - | - | 4 | 5 | 1 | 1 | <2 | <1 | - | 2 | 2 | 2 |
| Copper | 7 | 17 | 27 | 41 | - | 29 | 46 | - | 23 | - | - | 170 | 140 | 26 | 16 | 26 | 8 | - | 15 | 10 | 15 |
| Iron | 4900 | 15,000 | 28,000 | 27,000 | - | 11,000 | 11,000 | - | - | - | - | 8500 | 8700 | 6000 | 5500 | 6660 | 2700 | - | 8400 | 14000 | 4600 |
| Lead | 6 | 16 | 9 | 12 | - | 100 | 240 | - | 4 | - | - | 770 | 670 | 190 | 54 | 163 | 14 | - | 75 | 68 | 44 |
| Magnesium | 1500 | 1700 | 820 | 1700 | - | 510 | 920 | - | - | - | - | 1500 | 1200 | 610 | 490 | 500 | 270 | - | 310 | 410 | 260 |
| Manganese | 60 | 81 | 15 | 43 | - | 64 | 130 | - | - | - | - | 260 | 290 | 60 | 34 | 56 | 19 | - | 140 | 130 | 53 |
| Mercury | <0.1 | <0.1 | <0.1 | <0.1 | - | 0.2 | 0.2 | - | <0.1 | - | - | 0.3 | 0.4 | 1.4 | 0.3 | 0.3 | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Nickel | 3 | 9 | 1 | 8 | - | 5 | 8 | - | 18 | - | - | 10 | 9 | 5 | 3 | 5 | 1 | - | 4 | 5 | 3 |
| Selenium | <3 | <2 | <3 | <3 | - | <2 | <2 | - | - | - | - | <2 | <2 | <2 | <2 | <5 | <2 | - | <2 | <2 | <2 |
| Tin | <1 | <1 | <1 | <1 | - | 6 | 6 | - | - | - | - | 3 | 3 | 1 | <1 | <5 | <1 | - | 1 | 1 | <1 |
| Zinc | 15 | 120 | 12 | 49 | - | 170 | 500 | - | 34 | - | - | 620 | 470 | 110 | 39 | 150 | 14 | - | 89 | 50 | 46 |
| **TRH** | | | | | | | | | | | | | | | | | | | | | |
| C10-C16 | <50 | <50 | <50 | <50 | - | <50 | <50 | - | <50 | - | - | - | <50 | - | - | - | - | - | <50 | <50 | <50 |
| C16-C34 | <100 | <100 | <100 | <100 | - | <100 | 290 | - | 300 | - | - | - | 190 | - | - | - | - | - | <100 | <100 | <100 |
| C34-C40 | <100 | <100 | <100 | <100 | - | <100 | <100 | - | 110 | - | - | - | <100 | - | - | - | - | - | <100 | <100 | <100 |
| F2-NAPHTHALENE | <50 | <50 | <50 | <50 | - | <50 | <50 | - | <50 | - | - | - | <50 | - | - | - | - | - | <50 | <50 | <50 |
| C6 - C9 | <25 | <25 | <25 | <25 | - | <25 | <25 | - | <25 | - | - | - | <25 | - | - | - | - | - | <25 | <25 | <25 |
| C10 - C14 | <50 | <50 | <50 | <50 | - | <50 | <50 | - | <50 | - | - | - | <50 | - | - | - | - | - | <50 | <50 | <50 |
| C15 - C28 | <100 | <100 | <100 | <100 | - | <100 | 210 | - | 240 | - | - | - | 120 | - | - | - | - | - | <100 | <100 | <100 |
| C29-C36 | <100 | <100 | <100 | <100 | - | <100 | 110 | - | 130 | - | - | - | 100 | - | - | - | - | - | <100 | <100 | <100 |
| +C10 - C36 (Sum of total) | <250 | <250 | <250 | <250 | - | <250 | 345 | - | 395 | - | - | - | 245 | - | - | - | - | - | <250 | <250 | <250 |
| C10 - C40 (Sum of total) | <50 | <50 | <50 | <50 | - | <50 | 290 | - | 410 | - | - | - | 190 | - | - | - | - | - | <50 | <50 | <50 |
| C6-C10 less BTEX (F1) | <25 | <25 | <25 | <25 | - | <25 | <25 | - | <25 | - | - | - | <25 | - | - | - | - | - | <25 | <25 | <25 |
| C6-C10 | <25 | <25 | <25 | <25 | - | <25 | <25 | - | <25 | - | - | - | <25 | - | - | - | - | - | <25 | <25 | <25 |
| **BTEX** | | | | | | | | | | | | | | | | | | | | | |
| Benzene | <0.2 | <0.2 | <0.2 | <0.2 | - | <0.2 | <0.2 | - | <0.2 | - | - | - | <0.2 | - | - | - | - | - | <0.2 | <0.2 | <0.2 |
| Ethylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | <1 | - | - | - | <1 | - | - | - | - | - | <1 | <1 | <1 |
| Toluene | <0.5 | <0.5 | <0.5 | <0.5 | - | <0.5 | <0.5 | - | <0.5 | - | - | - | <0.5 | - | - | - | - | - | <0.5 | <0.5 | <0.5 |
| Xylene (m & p) | <2 | <2 | <2 | <2 | - | <2 | <2 | - | <2 | - | - | - | <2 | - | - | - | - | - | <2 | <2 | <2 |
| Xylene (o) | <1 | <1 | <1 | <1 | - | <1 | <1 | - | <1 | - | - | - | <1 | - | - | - | - | - | <1 | <1 | <1 |
| Xylene Total | <3 | <3 | <3 | <3 | - | <3 | <3 | - | <3 | - | - | - | <3 | - | - | - | - | - | <3 | <3 | <3 |
| **MAH** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-trimethylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,3,5-trimethylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Isopropylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| n-butylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| n-propylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| p-isopropyltoluene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| sec-butylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Styrene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| tert-butylbenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| **Chlorinated Hydrocarbons** | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1,2-tetrachloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,1,1-trichloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,1,2,2-tetrachloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,1,2-trichloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,1-dichloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,1-dichloroethene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,1-dichloropropene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,2,3-trichloropropane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,2-dibromo-3-chloropropane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,2-dichloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,2-dichloropropane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,3-dichloropropane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 2,2-dichloropropane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Bromochloromethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Bromodichloromethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Bromoform | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Carbon tetrachloride | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Chlorodibromomethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Chloroethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Chloroform | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Chloromethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| cis-1,2-dichloroethene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| cis-1,3-dichloropropene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Dibromomethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Hexachlorobutadiene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Trichloroethene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Tetrachloroethene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| trans-1,2-dichloroethene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| trans-1,3-dichloropropene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Vinyl chloride | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| **Halogenated Hydrocarbons** | | | | | | | | | | | | | | | | | | | | | |
| 1,2-dibromoethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Bromomethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Dichlorodifluoromethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Trichlorofluoromethane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| **Halogenated Benzenes** | | | | | | | | | | | | | | | | | | | | | |
| 1,2,3-trichlorobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,2,4-trichlorobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,2-dichlorobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,3-dichlorobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 1,4-dichlorobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 2-chlorotoluene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| 4-chlorotoluene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Bromobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Chlorobenzene | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| Hexachlorobenzene | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| **Solvents** | | | | | | | | | | | | | | | | | | | | | |
| Cyclohexane | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - | - | - | - | - | - | - | <1 | - | - |
| **PAH/Phenols** | | | | | | | | | | | | | | | | | | | | | |
| Total Positive PAHs | <0.05 | 42 | <0.05 | <0.05 | - | 20 | 77 | - | 100 | - | - | 23 | 39 | 12 | 10 | 21.8 | 0.1 | - | 4.4 | 6.4 | 1.8 |
| Acenaphthene | <0.1 | 0.3 | <0.1 | <0.1 | - | <0.1 | 0.1 | - | 5.7 | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Acenaphthylene | <0.1 | <0.1 | <0.1 | <0.1 | - | 0.1 | 0.8 | - | 0.2 | - | - | 0.3 | 0.6 | 0.2 | 0.2 | 0.6 | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Anthracene | <0.1 | 0.8 | <0.1 | <0.1 | - | 0.3 | 2.2 | - | 4.2 | - | - | 0.3 | 0.7 | 0.2 | 0.2 | 0.8 | <0.1 | - | 0.1 | 0.2 | <0.1 |
| Benz(a)anthracene | <0.1 | 2.7 | <0.1 | <0.1 | - | 2 | 8 | - | 8.5 | - | - | 1.9 | 3.5 | 1.3 | 1.2 | 2.1 | <0.1 | - | 0.4 | 0.7 | 0.2 |
| Benzo(a) pyrene | <0.05 | 3 | <0.05 | <0.05 | - | 1.8 | 6.4 | - | 4.6 | - | - | 2.1 | 3.2 | 1.1 | 0.88 | 1.8 | <0.05 | - | 0.4 | 0.54 | 0.2 |
| Benzo(a)pyrene TEQ calc (zero) | <0.5 | 4.2 | <0.5 | <0.5 | - | 2.7 | 9.8 | - | 7.1 | - | - | 3 | 4.8 | 1.7 | 1.3 | 2.4 | <0.5 | - | 0.5 | 0.7 | <0.5 |
| Benzo(a)pyrene TEQ calc(half) | <0.5 | 4.2 | <0.5 | <0.5 | - | 2.7 | 9.8 | - | 7.1 | - | - | 3 | 4.8 | 1.7 | 1.3 | 2.7 | <0.5 | - | 0.6 | 0.8 | <0.5 |
| Benzo(a)pyrene TEQ calc(PQL) | <0.5 | 4.2 | <0.5 | <0.5 | - | 2.7 | 9.8 | - | 7.1 | - | - | 3 | 4.8 | 1.7 | 1.3 | 2.9 | <0.5 | - | 0.6 | 0.8 | <0.5 |
| Benzo(b,j+k)fluoranthene | <0.2 | 4.2 | <0.2 | <0.2 | - | 3 | 10 | - | 8.5 | - | - | 3.6 | 5.6 | 2 | 2 | 3.1 | <0.2 | - | 0.7 | 1 | 0.3 |
| Benzo(g,h,i)perylene | <0.1 | 2.3 | <0.1 | <0.1 | - | 1.1 | 3 | - | 2.6 | - | - | 1.3 | 1.7 | 0.5 | 0.4 | 1 | <0.1 | - | 0.2 | 0.2 | <0.1 |
| Chrysene | <0.1 | 2.1 | <0.1 | <0.1 | - | 1.6 | 5.5 | - | 7.1 | - | - | 1.9 | 3.2 | 1.2 | 1 | 1.8 | <0.1 | - | 0.4 | 0.6 | 0.2 |
| Dibenz(a,h)anthracene | <0.1 | 0.3 | <0.1 | <0.1 | - | 0.2 | 1.2 | - | 0.5 | - | - | 0.3 | 0.4 | 0.1 | 0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Fluoranthene | <0.1 | 9 | <0.1 | <0.1 | - | 3.9 | 13 | - | 20 | - | - | 4.1 | 7.4 | 2.1 | 1.9 | 4.6 | 0.1 | - | 0.8 | 1.3 | 0.4 |
| Fluorene | <0.1 | 0.3 | <0.1 | <0.1 | - | <0.1 | 0.8 | - | 1.5 | - | - | <0.1 | 0.4 | <0.1 | <0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Indeno(1,2,3-c,d)pyrene | <0.1 | 1.6 | <0.1 | <0.1 | - | 0.9 | 2.7 | - | 2.4 | - | - | 1.3 | 1.7 | 0.5 | 0.4 | 0.9 | <0.1 | - | 0.2 | 0.2 | <0.1 |
| Naphthalene | <0.1 | <0.1 | <0.1 | <0.1 | - | <0.1 | <1 - 0.4 | - | <1 - 0.4 | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 |
| Phenanthrene | <0.1 | 6.1 | <0.1 | <0.1 | - | 1.5 | 10 | - | 20 | - | - | 1.9 | 4 | 1 | 0.9 | 2.3 | <0.1 | - | 0.5 | 0.6 | 0.2 |
| Phenolics Total | <5 | - | - | - | - | <5 | <5 | - | - | - | - | - | - | - | - | - | - | - | <5 | - | - |
| Pyrene | <0.1 | 9 | <0.1 | <0.1 | - | 3.7 | 13 | - | 17 | - | - | 3.7 | 6.4 | 1.8 | 1.6 | 4 | <0.1 | - | 0.8 | 1 | 0.4 |
| **Polychlorinated biphenyls** | | | | | | | | | | | | | | | | | | | | | |
| PCBs (Sum of total) | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1016 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1221 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1232 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1242 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1248 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1254 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Arochlor 1260 | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| **Organochlorine pesticides** | | | | | | | | | | | | | | | | | | | | | |
| Endosulfan | <0.3 | - | - | - | - | <0.3 | <0.3 | - | - | - | - | - | - | - | - | - | - | - | <0.3 | - | - |
| 4,4-DDE | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| a-BHC | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Aldrin | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Aldrin + Dieldrin | <0.2 | - | - | - | - | <0.2 | <0.2 | - | - | - | - | - | - | - | - | - | - | - | <0.2 | - | - |
| b-BHC | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Chlordane (cis) | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Chlordane (trans) | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| d-BHC | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| DDD | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| DDT | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| DDT+DDE+DDD | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Dieldrin | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Endosulfan I | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Endosulfan II | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Endosulfan sulphate | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Endrin | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Endrin aldehyde | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| g-BHC (Lindane) | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Heptachlor | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Heptachlor epoxide | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Methoxychlor | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| **Organophosphorous Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| Azinophos methyl | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Bromophos-ethyl | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Chlorpyrifos | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Chlorpyrifos-methyl | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Diazinon | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Dichlorvos | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Dimethoate | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Ethion | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Fenitrothion | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Malathion | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Parathion | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| Ronnel | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - | - | - | - | <0.1 | - | - |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | | |
| Moderately Harmful Pesticides (total) | <0.6 | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - | - | - | - | - | - | - | <0.6 | - | - |
| Pesticides (total, NSW Waste 2014) | <0.6 | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - | - | - | - | - | - | - | <0.6 | - | - |
| Scheduled chemicals (NSW Waste 2014) | <2.3 | <1 | <1 | <1 | - | <2.3 | <2.3 | - | - | - | - | - | - | - | - | - | - | - | <2.3 | - | - |
| **Asbestos** | | | | | | | | | | | | | | | | | | | | | |
| Asbestos Identification | - | - | - | - | - | - | - | - | ND | D | ND | - | ND | - | - | - | - | D | ND | - | ND |

| Field_ID | 306/0.5 | 307/F1 | 307/F1S | 307/F2 | 307/F2S | 308/0.1 | 309/0.3 | 309/0.5 | 310/F1 | 310/0.2 | S1 | S2 | 55499_BH1 | 55499_BH4 | 55499_BH5 | 55499_BH6 | 55499_BH7 | 55499_BH8 | 55499_BH9 | 55499_BH10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LocCode | 306 | 307 | 307 | 307 | 307 | 308 | 309 | 309 | 310 | 310 | Stockpile B | Stockpile B | BH1 | BH4 | BH5 | BH6 | BH7 | BH8 | BH9 | BH10 |
| Fill (F) / Natural (N) | N | F | F | F | F | F | F | N | F | N | F | F | F | F | F | F | F | F | F | F |
| Sample Depth | 0.5 | | | | | 0.1 | 0.3 | 0.5 | 0.05 | 0.2 | | | 0.3 | 0.5 | 0.1 | 0.5 | 0.1 | 0.1 | 0.6 | 0.4 |
| Sample Date | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 12/03/2020 | 12/03/2020 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 |
| Coal Tar Identification | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Metals** | | | | | | | | | | | | | | | | | | | | |
| Aluminium | 18000 | - | - | - | - | 5700 | 5800 | 9500 | - | 9400 | 10000 | 6600 | - | - | - | - | - | - | - | - |
| Antimony | <7 | - | - | - | - | <7 | <7 | <7 | - | <7 | <7 | <7 | - | - | - | - | - | - | - | - |
| Arsenic | 10 | - | - | - | - | <4 | 7 | 6 | - | 5 | 8 | 5 | 5 | <4 | 7 | <4 | <4 | <4 | 4 | 5 |
| Boron | <3 | - | - | - | - | 4 | <3 | 4 | - | <3 | <3 | <3 | - | - | - | - | - | - | - | - |
| Cadmium | <0.4 | - | - | - | - | <0.4 | <0.4 | <0.4 | - | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | 2 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| Chromium (III+VI) | 23 | - | - | - | - | 11 | 9 | 12 | - | 15 | 11 | 7 | 9 | 9 | 27 | 10 | 17 | 18 | 9 | 22 |
| Cobalt | <1 | - | - | - | - | 3 | 11 | 15 | - | <1 | 2 | <1 | - | - | - | - | - | - | - | - |
| Copper | 3 | - | - | - | - | 30 | 18 | 360 | - | <1 | 14 | 7 | 19 | 17 | 420 | 10 | 65 | 20 | 39 | 9 |
| Iron | 36000 | - | - | - | - | 7800 | 17000 | 13000 | - | 17000 | 23000 | 14000 | - | - | - | - | - | - | - | - |
| Lead | 10 | - | - | - | - | 19 | 50 | 180 | - | 5 | 44 | 22 | 58 | 40 | 1400 | 8 | 38 | 25 | 70 | 14 |
| Magnesium | 780 | - | - | - | - | 1800 | 1700 | 2100 | - | 380 | 1200 | 650 | - | - | - | - | - | - | - | - |
| Manganese | 6 | - | - | - | - | 270 | 500 | 1100 | - | 3 | 580 | 210 | - | - | - | - | - | - | - | - |
| Mercury | <0.1 | - | - | - | - | <0.1 | <0.1 | 0.2 | - | <0.1 | 0.2 | 0.1 | 0.2 | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 | 0.4 | <0.1 |
| Nickel | 2 | - | - | - | - | 6 | 13 | 11 | - | <1 | 4 | 2 | 4 | 4 | 15 | 4 | 16 | 19 | 7 | 3 |
| Selenium | <4 | - | - | - | - | <2 | <2 | <2 | - | <2 | <2 | <2 | - | - | - | - | - | - | - | - |
| Tin | <1 | - | - | - | - | <1 | <1 | 3 | - | <1 | 3 | 1 | - | - | - | - | - | - | - | - |
| Zinc | 4 | - | - | - | - | 58 | 85 | 280 | - | 2 | 58 | 31 | 48 | 39 | 1100 | 35 | 210 | 75 | 85 | 13 |
| **TRH** | | | | | | | | | | | | | | | | | | | | |
| C10-C16 | <50 | - | - | - | - | <50 | <50 | <50 | - | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| C16-C34 | <100 | - | - | - | - | <100 | <100 | 220 | - | <100 | <100 | <100 | 120 | <100 | 240 | <100 | <100 | <100 | 340 | <100 |
| C34-C40 | <100 | - | - | - | - | <100 | <100 | 150 | - | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| F2-NAPHTHALENE | <50 | - | - | - | - | <50 | <50 | <50 | - | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| C6 - C9 | <25 | - | - | - | - | <25 | <25 | <25 | - | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| C10 - C14 | <50 | - | - | - | - | <50 | <50 | <50 | - | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| C15 - C28 | <100 | - | - | - | - | <100 | <100 | 130 | - | <100 | <100 | <100 | <100 | <100 | 160 | <100 | <100 | <100 | 240 | <100 |
| C29-C36 | <100 | - | - | - | - | <100 | <100 | 130 | - | <100 | <100 | <100 | <100 | <100 | 120 | <100 | <100 | <100 | 330 | <100 |
| +C10 - C36 (Sum of total) | <250 | - | - | - | - | <250 | <250 | 285 | - | <250 | <250 | <250 | <250 | <250 | 305 | <250 | <250 | <250 | 395 | <250 |
| C10 - C40 (Sum of total) | <50 | - | - | - | - | <50 | <50 | 360 | - | <50 | <50 | <50 | - | - | - | - | - | - | - | - |
| C6-C10 less BTEX (F1) | <25 | - | - | - | - | <25 | <25 | <25 | - | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| C6-C10 | <25 | - | - | - | - | <25 | <25 | <25 | - | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| **BTEX** | | | | | | | | | | | | | | | | | | | | |
| Benzene | <0.2 | - | - | - | - | <0.2 | <0.2 | <0.2 | - | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Ethylbenzene | <1 | - | - | - | - | <1 | <1 | <1 | - | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Toluene | <0.5 | - | - | - | - | <0.5 | <0.5 | <0.5 | - | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Xylene (m & p) | <2 | - | - | - | - | <2 | <2 | <2 | - | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Xylene (o) | <1 | - | - | - | - | <1 | <1 | <1 | - | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Xylene Total | <3 | - | - | - | - | <3 | <3 | <3 | - | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| **MAH** | | | | | | | | | | | | | | | | | | | | |
| 1,2,4-trimethylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,3,5-trimethylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Isopropylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| n-butylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| n-propylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| p-isopropyltoluene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| sec-butylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Styrene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| tert-butylbenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| **Chlorinated Hydrocarbons** | | | | | | | | | | | | | | | | | | | | |
| 1,1,1,2-tetrachloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1,1-trichloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1,2,2-tetrachloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1,2-trichloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1-dichloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1-dichloroethene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1-dichloropropene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2,3-trichloropropane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dibromo-3-chloropropane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dichloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dichloropropane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,3-dichloropropane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 2,2-dichloropropane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromochloromethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromodichloromethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromoform | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Carbon tetrachloride | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chlorodibromomethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chloroethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chloroform | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chloromethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| cis-1,2-dichloroethene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| cis-1,3-dichloropropene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Dibromomethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Hexachlorobutadiene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Trichloroethene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Tetrachloroethene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| trans-1,2-dichloroethene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| trans-1,3-dichloropropene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Vinyl chloride | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| **Halogenated Hydrocarbons** | | | | | | | | | | | | | | | | | | | | |
| 1,2-dibromoethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromomethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Dichlorodifluoromethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Trichlorofluoromethane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| **Halogenated Benzenes** | | | | | | | | | | | | | | | | | | | | |
| 1,2,3-trichlorobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2,4-trichlorobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dichlorobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,3-dichlorobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,4-dichlorobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 2-chlorotoluene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 4-chlorotoluene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chlorobenzene | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Hexachlorobenzene | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **Solvents** | | | | | | | | | | | | | | | | | | | | |
| Cyclohexane | - | - | - | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| **PAH/Phenols** | | | | | | | | | | | | | | | | | | | | |
| Total Positive PAHs | <0.05 | - | - | - | - | 7 | 4.8 | 25 | - | <0.05 | 8 | 6.9 | 50 | 1.3 | 62 | 3.7 | <0.05 | 0.58 | 61 | 19 |
| Acenaphthene | <0.1 | - | - | - | - | <0.1 | <0.1 | <0.1 | - | <0.1 | <0.1 | <0.1 | 0.1 | <0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthylene | <0.1 | - | - | - | - | <0.1 | <0.1 | 0.3 | - | <0.1 | <0.1 | <0.1 | 0.6 | <0.1 | 1.2 | <0.1 | <0.1 | <0.1 | 1.3 | 0.4 |
| Anthracene | <0.1 | - | - | - | - | 0.1 | 0.1 | 0.5 | - | <0.1 | 0.3 | 0.4 | 1.6 | <0.1 | 1.4 | <0.1 | <0.1 | <0.1 | 2.1 | 0.6 |
| Benz(a)anthracene | <0.1 | - | - | - | - | 0.6 | 0.5 | 2.4 | - | <0.1 | 0.6 | 0.6 | 4.3 | 0.1 | 4.5 | 0.2 | <0.1 | <0.1 | 6.3 | 1.5 |
| Benzo(a) pyrene | <0.05 | - | - | - | - | 0.5 | 0.4 | 2.2 | - | <0.05 | 0.53 | 0.4 | 3.6 | 0.1 | 4.7 | 0.3 | <0.05 | 0.1 | 5 | 1.4 |
| Benzo(a)pyrene TEQ calc (zero) | <0.5 | - | - | - | - | 0.7 | 0.5 | 3.1 | - | <0.5 | 0.7 | 0.6 | 5.2 | <0.5 | 6.8 | <0.5 | <0.5 | <0.5 | 7.3 | 2 |
| Benzo(a)pyrene TEQ calc(half) | <0.5 | - | - | - | - | 0.7 | 0.6 | 3.1 | - | <0.5 | 0.8 | 0.6 | 5.2 | <0.5 | 6.8 | <0.5 | <0.5 | <0.5 | 7.3 | 2 |
| Benzo(a)pyrene TEQ calc(PQL) | <0.5 | - | - | - | - | 0.8 | 0.6 | 3.1 | - | <0.5 | 0.8 | 0.7 | 5.2 | <0.5 | 6.8 | <0.5 | <0.5 | <0.5 | 7.3 | 2 |
| Benzo(b,j+k)fluoranthene | <0.2 | - | - | - | - | 0.9 | 0.7 | 3.5 | - | <0.2 | 0.9 | 0.7 | 6 | 0.2 | 7.8 | 0.5 | <0.2 | <0.2 | 7.9 | 2.2 |
| Benzo(g,h,i)perylene | <0.1 | - | - | - | - | 0.3 | 0.2 | 1 | - | <0.1 | 0.3 | 0.3 | 1.9 | <0.1 | 2.7 | 0.2 | <0.1 | <0.1 | 1.8 | 0.6 |
| Chrysene | <0.1 | - | - | - | - | 0.5 | 0.4 | 2.1 | - | <0.1 | 0.6 | 0.5 | 3.9 | 0.1 | 4.7 | 0.3 | <0.1 | 0.1 | 5.4 | 1.4 |
| Dibenz(a,h)anthracene | <0.1 | - | - | - | - | <0.1 | <0.1 | 0.2 | - | <0.1 | <0.1 | <0.1 | 0.3 | <0.1 | 0.5 | <0.1 | <0.1 | <0.1 | 0.6 | 0.1 |
| Fluoranthene | <0.1 | - | - | - | - | 1.7 | 1 | 5 | - | <0.1 | 1.6 | 1.5 | 9.9 | 0.3 | 12 | 0.8 | <0.1 | 0.2 | 11 | 3.6 |
| Fluorene | <0.1 | - | - | - | - | <0.1 | <0.1 | 0.3 | - | <0.1 | 0.1 | 0.1 | 0.2 | <0.1 | 0.4 | <0.1 | <0.1 | <0.1 | 0.3 | 0.1 |
| Indeno(1,2,3-c,d)pyrene | <0.1 | - | - | - | - | 0.3 | 0.2 | 1 | - | <0.1 | 0.3 | 0.2 | 2.1 | <0.1 | 3 | 0.2 | <0.1 | <0.1 | 2.2 | 0.8 |
| Naphthalene | <0.1 | - | - | - | - | <0.1 | <0.1 | <0.1 | - | <0.1 | <0.1 | <0.1 | <1 - 0.1 | <0.1 | <1 - 0.2 | <0.1 | <0.1 | <0.1 | <1 - 0.3 | <0.1 |
| Phenanthrene | <0.1 | - | - | - | - | 0.6 | 0.4 | 2.6 | - | <0.1 | 1.2 | 1 | 6.7 | 0.1 | 7.8 | 0.4 | <0.1 | <0.1 | 6.5 | 2.6 |
| Phenolics Total | - | - | - | - | - | - | - | - | - | - | <5 | <5 | - | - | - | - | - | - | - | - |
| Pyrene | <0.1 | - | - | - | - | 1.5 | 0.8 | 4.4 | - | <0.1 | 1.4 | 1.2 | 8.9 | 0.3 | 11 | 0.8 | <0.1 | 0.2 | 10 | 3.3 |
| **Polychlorinated biphenyls** | | | | | | | | | | | | | | | | | | | | |
| PCBs (Sum of total) | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - |
| Arochlor 1016 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1221 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1232 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1242 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1248 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1254 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1260 | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **Organochlorine pesticides** | | | | | | | | | | | | | | | | | | | | |
| Endosulfan | - | - | - | - | - | - | - | - | - | - | <0.3 | <0.3 | - | - | - | - | - | - | - | - |
| 4,4-DDE | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| a-BHC | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aldrin | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aldrin + Dieldrin | - | - | - | - | - | - | - | - | - | - | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| b-BHC | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlordane (cis) | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlordane (trans) | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| d-BHC | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| DDD | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| DDT | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| DDT+DDE+DDD | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| Dieldrin | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan I | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan II | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan sulphate | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endrin | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endrin aldehyde | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| g-BHC (Lindane) | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Heptachlor | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Heptachlor epoxide | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Methoxychlor | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **Organophosphorous Pesticides** | | | | | | | | | | | | | | | | | | | | |
| Azinophos methyl | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bromophos-ethyl | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorpyrifos | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorpyrifos-methyl | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Diazinon | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dichlorvos | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dimethoate | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ethion | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fenitrothion | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Malathion | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Parathion | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ronnel | - | - | - | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| **Pesticides** | | | | | | | | | | | | | | | | | | | | |
| Moderately Harmful Pesticides (total) | - | - | - | - | - | - | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - | - | - | - |
| Pesticides (total, NSW Waste 2014) | - | - | - | - | - | - | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - | - | - | - |
| Scheduled chemicals (NSW Waste 2014) | - | - | - | - | - | - | - | - | - | - | <2.3 | <2.3 | - | - | - | - | - | - | - | - |
| **Asbestos** | | | | | | | | | | | | | | | | | | | | |
| Asbestos Identification | - | ND | ND | D | ND | ND | ND | - | D | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

Notes to Table:
D - Detected
ND - Not Detected at laboratory reporting limit
1 - ESL for B(a)P based on CRC CARE (2017) high reliability screening levels for aged contamination

## Table 11: Results of Chemical Analysis of Soil (Waste Classification)

| Analyte | Units | PQL | NSW EPA 2014 - General Solid Waste CT1 (No TCLP) | NSW EPA 2014 - Restricted Solid Waste CT2 (No TCLP) | ENM RRO Max Avg | ENM RRO Abs Max | Field_ID | 201/0.9-1.2 | 201/7.9 | 202/4.8 | 202/7.0 | 203/0-0.05 | 203/0.5 | D3 | MS4 / 0.02 | MS4 / 0.2 | F1 | F2 | 301/0.05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | LocCode | 201 | 201 | 202 | 202 | 203 | 203 | 203 | MS4 | MS4 | F1 | F2 | 301 |
| | | | | | | | Fill (F) / Natural (N) | F | N | N | N | Asphalt | N | N | Asphalt | F | Material | Material | F |
| | | | | | | | Sample Depth | 0.9-1.2 | 7.9 | 4.8 | 7 | 0-0.05 | 0.5 | 0.5 | 0.02 | 0.2 | Surface | Surface | 0.05 |
| | | | | | | | Sample Date | 12/12/2019 | 12/12/2019 | 11/12/2019 | 11/12/2019 | 11/12/2019 | 11/12/2019 | 11/12/2019 | 19/11/2019 | 19/11/2019 | 22/11/2019 | 22/11/2019 | 3/03/2020 |
| **Coal Tar Identification** | - | | | | | | | - | - | - | - | ND | - | - | ND | - | - | - | - |
| Metals | | | | | | | | | | | | | | | | | | | |
| Aluminium | mg/kg | 10 | | | | | | 5000 | 7000 | 9000 | 8900 | - | 7000 | 6400 | - | - | - | - | 5000 |
| Antimony | mg/kg | 7 | | | | | | <7 | <7 | <7 | <7 | - | <7 | <7 | - | - | - | - | <7 |
| Arsenic | mg/kg | 4 | 100 | 400 | 20 | 40 | | <4 | 5 | 10 | <4 | - | 24 | 14 | - | <4 | - | - | <4 |
| Boron | mg/kg | 3 | | | | | | <5 | <3 | <3 | <3 | - | <3 | <3 | - | - | - | - | 5 |
| Cadmium | mg/kg | 0.4 | 20 | 80 | 0.5 | 1 | | <0.4 | <0.4 | <0.4 | <0.4 | - | <0.4 | 2 | - | <0.4 | - | - | 1 |
| Chromium (III+VI) | mg/kg | 1 | 100 | 400 | 75 | 150 | | 4 | 9 | 12 | 11 | - | 7 | 10 | - | 24 | - | - | 21 |
| Cobalt | mg/kg | 1 | | | | | | 1 | 4 | <1 | 2 | - | 1 | 3 | - | - | - | - | 4 |
| Copper | mg/kg | 1 | | | 100 | 200 | | 7 | 17 | 27 | 41 | - | 29 | 46 | - | 23 | - | - | 170 |
| Iron | mg/kg | 10 | | | | | | 4900 | 15,000 | 28,000 | 27,000 | - | 11,000 | 11,000 | - | - | - | - | 8500 |
| Lead | mg/kg | 1 | 100 | 400 | 50 | 100 | | 6 | 16 | 9 | 12 | - | 100 | 240 | - | 4 | - | - | 770 |
| Magnesium | mg/kg | 10 | | | | | | 1500 | 1700 | 820 | 1700 | - | 510 | 920 | - | - | - | - | 1500 |
| Manganese | mg/kg | 1 | | | | | | 60 | 81 | 15 | 43 | - | 64 | 130 | - | - | - | - | 260 |
| Mercury | mg/kg | 0.1 | 4 | 16 | 0.5 | 1 | | <0.1 | <0.1 | <0.1 | <0.1 | - | 0.2 | 0.2 | - | <0.1 | - | - | 0.3 |
| Nickel | mg/kg | 1 | 40 | 160 | 30 | 60 | | 3 | 9 | 1 | 8 | - | 5 | 8 | - | 18 | - | - | 10 |
| Selenium | mg/kg | 2 | 20 | 80 | | | | <3 | <2 | <3 | <3 | - | <2 | <2 | - | - | - | - | <2 |
| Tin | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | 6 | 6 | - | - | - | - | 3 |
| Zinc | mg/kg | 1 | | | 150 | 300 | | 15 | 120 | 12 | 49 | - | 170 | 500 | - | 34 | - | - | 620 |
| TRH | | | | | | | | | | | | | | | | | | | |
| C10-C16 | mg/kg | 50 | | | | | | <50 | <50 | <50 | <50 | - | <50 | <50 | - | <50 | - | - | - |
| C16-C34 | mg/kg | 100 | | | | | | <100 | <100 | <100 | <100 | - | <100 | 290 | - | 300 | - | - | - |
| C34-C40 | mg/kg | 100 | | | | | | <100 | <100 | <100 | <100 | - | <100 | <100 | - | 110 | - | - | - |
| F2-NAPHTHALENE | mg/kg | 50 | | | | | | <50 | <50 | <50 | <50 | - | <50 | <50 | - | <50 | - | - | - |
| C6 - C9 | mg/kg | 25 | 650 | 2600 | | | | <25 | <25 | <25 | <25 | - | <25 | <25 | - | <25 | - | - | - |
| C10 - C14 | mg/kg | 50 | | | | | | <50 | <50 | <50 | <50 | - | <50 | <50 | - | <50 | - | - | - |
| C15 - C28 | mg/kg | 100 | | | | | | <100 | <100 | <100 | <100 | - | <100 | 210 | - | 240 | - | - | - |
| C29-C36 | mg/kg | 100 | | | | | | <100 | <100 | <100 | <100 | - | <100 | 110 | - | 130 | - | - | - |
| +C10 - C36 (Sum of total) | mg/kg | | 10000 | 40000 | 250 | 500 | | <250 | <250 | <250 | <250 | - | <250 | 345 | - | 395 | - | - | - |
| C10 - C40 (Sum of total) | mg/kg | 50 | | | | | | <50 | <50 | <50 | <50 | - | <50 | 290 | - | 410 | - | - | - |
| C6-C10 less BTEX (F1) | mg/kg | 25 | | | | | | <25 | <25 | <25 | <25 | - | <25 | <25 | - | <25 | - | - | - |
| C6-C10 | mg/kg | 25 | | | | | | <25 | <25 | <25 | <25 | - | <25 | <25 | - | <25 | - | - | - |
| BTEX | | | | | | | | | | | | | | | | | | | |
| Benzene | mg/kg | 0.2 | 10 | 40 | | 0.5 | | <0.2 | <0.2 | <0.2 | <0.2 | - | <0.2 | <0.2 | - | <0.2 | - | - | - |
| Ethylbenzene | mg/kg | 1 | 600 | 2400 | | 25 | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | <1 | - | - | - |
| Toluene | mg/kg | 0.5 | 288 | 1152 | | 65 | | <0.5 | <0.5 | <0.5 | <0.5 | - | <0.5 | <0.5 | - | <0.5 | - | - | - |
| Xylene (m & p) | mg/kg | 2 | | | | | | <2 | <2 | <2 | <2 | - | <2 | <2 | - | <2 | - | - | - |
| Xylene (o) | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | <1 | - | - | - |
| Xylene Total | mg/kg | 3 | 1000 | 4000 | | 15 | | <3 | <3 | <3 | <3 | - | <3 | <3 | - | <3 | - | - | - |
| MAH | | | | | | | | | | | | | | | | | | | |
| 1,2,4-trimethylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,3,5-trimethylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Isopropylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| n-butylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| n-propylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| p-isopropyltoluene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| sec-butylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Styrene | mg/kg | 1 | 60 | 240 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| tert-butylbenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Chlorinated Hydrocarbons | | | | | | | | | | | | | | | | | | | |
| 1,1,1,2-tetrachloroethane | mg/kg | 1 | 200 | 800 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,1,1-trichloroethane | mg/kg | 1 | 600 | 2400 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,1,2,2-tetrachloroethane | mg/kg | 1 | 26 | 104 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,1,2-trichloroethane | mg/kg | 1 | 24 | 96 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,1-dichloroethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,1-dichloroethene | mg/kg | 1 | 14 | 56 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,1-dichloropropene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,2,3-trichloropropane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,2-dibromo-3-chloropropane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,2-dichloroethane | mg/kg | 1 | 10 | 40 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,2-dichloropropane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,3-dichloropropane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 2,2-dichloropropane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Bromochloromethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Bromodichloromethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Bromoform | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Carbon tetrachloride | mg/kg | 1 | 10 | 40 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Chlorodibromomethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Chloroethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Chloroform | mg/kg | 1 | 120 | 480 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Chloromethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| cis-1,2-dichloroethene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| cis-1,3-dichloropropene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Dibromomethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Hexachlorobutadiene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Trichloroethene | mg/kg | 1 | 10 | 40 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Tetrachloroethene | mg/kg | 1 | 14 | 56 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| trans-1,2-dichloroethene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| trans-1,3-dichloropropene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Vinyl chloride | mg/kg | 1 | 4 | 16 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Halogenated Hydrocarbons | | | | | | | | | | | | | | | | | | | |
| 1,2-dibromoethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Bromomethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Dichlorodifluoromethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Trichlorofluoromethane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Halogenated Benzenes | | | | | | | | | | | | | | | | | | | |
| 1,2,3-trichlorobenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,2,4-trichlorobenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,2-dichlorobenzene | mg/kg | 1 | 86 | 344 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,3-dichlorobenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 1,4-dichlorobenzene | mg/kg | 1 | 150 | 600 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 2-chlorotoluene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| 4-chlorotoluene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Bromobenzene | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Chlorobenzene | mg/kg | 1 | 2000 | 8000 | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| Hexachlorobenzene | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Solvents | | | | | | | | | | | | | | | | | | | |
| Cyclohexane | mg/kg | 1 | | | | | | <1 | <1 | <1 | <1 | - | <1 | <1 | - | - | - | - | - |
| PAH/Phenols | | | | | | | | | | | | | | | | | | | |
| Total Positive PAHs | mg/kg | 0.05 | 200 | 800 | 20 | 40 | | <0.05 | 42 | <0.05 | <0.05 | - | 20 | 77 | - | 100 | - | - | 23 |
| Acenaphthene | mg/kg | 0.1 | | | | | | <0.1 | 0.3 | <0.1 | <0.1 | - | <0.1 | 0.1 | - | 5.7 | - | - | <0.1 |
| Acenaphthylene | mg/kg | 0.1 | | | | | | <0.1 | <0.1 | <0.1 | <0.1 | - | 0.1 | 0.8 | - | 0.2 | - | - | 0.3 |
| Anthracene | mg/kg | 0.1 | | | | | | <0.1 | 0.8 | <0.1 | <0.1 | - | 0.3 | 2.2 | - | 4.2 | - | - | 0.3 |
| Benz(a)anthracene | mg/kg | 0.1 | | | | | | <0.1 | 2.7 | <0.1 | <0.1 | - | 2 | 8 | - | 8.5 | - | - | 1.9 |
| Benzo(a) pyrene | mg/kg | 0.05 | 0.8 | 3.2 | 0.5 | 1 | | <0.05 | 3 | <0.05 | <0.05 | - | 1.8 | 6.4 | - | 4.6 | - | - | 2.1 |
| Benzo(a)pyrene TEQ calc (zero) | mg/kg | 0.5 | | | | | | <0.5 | 4.2 | <0.5 | <0.5 | - | 2.7 | 9.8 | - | 7.1 | - | - | 3 |
| Benzo(a)pyrene TEQ calc(half) | mg/kg | 0.5 | | | | | | <0.5 | 4.2 | <0.5 | <0.5 | - | 2.7 | 9.8 | - | 7.1 | - | - | 3 |
| Benzo(a)pyrene TEQ calc(PQL) | mg/kg | 0.5 | | | | | | <0.5 | 4.2 | <0.5 | <0.5 | - | 2.7 | 9.8 | - | 7.1 | - | - | 3 |
| Benzo(b,j+k)fluoranthene | mg/kg | 0.2 | | | | | | <0.2 | 4.2 | <0.2 | <0.2 | - | 3 | 10 | - | 8.5 | - | - | 3.6 |
| Benzo(g,h,i)perylene | mg/kg | 0.1 | | | | | | <0.1 | 2.3 | <0.1 | <0.1 | - | 1.1 | 3 | - | 2.6 | - | - | 1.3 |
| Chrysene | mg/kg | 0.1 | | | | | | <0.1 | 2.1 | <0.1 | <0.1 | - | 1.6 | 5.5 | - | 7.1 | - | - | 1.9 |
| Dibenz(a,h)anthracene | mg/kg | 0.1 | | | | | | <0.1 | 0.3 | <0.1 | <0.1 | - | 0.2 | 1.2 | - | 0.5 | - | - | 0.3 |
| Fluoranthene | mg/kg | 0.1 | | | | | | <0.1 | 9 | <0.1 | <0.1 | - | 3.9 | 13 | - | 20 | - | - | 4.1 |
| Fluorene | mg/kg | 0.1 | | | | | | <0.1 | 0.3 | <0.1 | <0.1 | - | <0.1 | 0.8 | - | 1.5 | - | - | <0.1 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | 0.1 | | | | | | <0.1 | 1.6 | <0.1 | <0.1 | - | 0.9 | 2.7 | - | 2.4 | - | - | 1.3 |
| Naphthalene | mg/kg | 0.1 | | | | | | <0.1 | <0.1 | <0.1 | <0.1 | - | <0.1 | <1 - 0.4 | - | <1 - 0.4 | - | - | <0.1 |
| Phenanthrene | mg/kg | 0.1 | | | | | | <0.1 | 6.1 | <0.1 | <0.1 | - | 1.5 | 10 | - | 20 | - | - | 1.9 |
| Phenolics Total | mg/kg | 5 | 288 | 1152 | | | | <5 | - | - | - | - | <5 | <5 | - | - | - | - | - |
| Pyrene | mg/kg | 0.1 | | | | | | <0.1 | 9 | <0.1 | <0.1 | - | 3.7 | 13 | - | 17 | - | - | 3.7 |
| Polychlorinated biphenyls | | | | | | | | | | | | | | | | | | | |
| PCBs (Sum of total) | mg/kg | 0.1 | 49.9999 | 49.9999 | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1016 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1221 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1232 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1242 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1248 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1254 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Arochlor 1260 | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Organochlorine pesticides | | | | | | | | | | | | | | | | | | | |
| Endosulfan | mg/kg | | 60 | 240 | | | | <0.3 | - | - | - | - | <0.3 | <0.3 | - | - | - | - | - |
| 4,4-DDE | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| a-BHC | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Aldrin | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Aldrin + Dieldrin | mg/kg | | | | | | | <0.2 | - | - | - | - | <0.2 | <0.2 | - | - | - | - | - |
| b-BHC | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Chlordane (cis) | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Chlordane (trans) | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| d-BHC | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| DDD | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| DDT | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| DDT+DDE+DDD | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Dieldrin | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Endosulfan I | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Endosulfan II | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Endosulfan sulphate | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Endrin | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Endrin aldehyde | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| g-BHC (Lindane) | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Heptachlor | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Heptachlor epoxide | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Methoxychlor | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Organophosphorous Pesticides | | | | | | | | | | | | | | | | | | | |
| Azinophos methyl | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Bromophos-ethyl | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Chlorpyrifos | mg/kg | 0.1 | 4 | 16 | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Chlorpyrifos-methyl | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Diazinon | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Dichlorvos | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Dimethoate | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Ethion | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Fenitrothion | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Malathion | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Parathion | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Ronnel | mg/kg | 0.1 | | | | | | <0.1 | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - |
| Pesticides | | | | | | | | | | | | | | | | | | | |
| Moderately Harmful Pesticides (total) | mg/kg | | 250 | 1000 | | | | <0.6 | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - |
| Pesticides (total, NSW Waste 2014) | mg/kg | | | | | | | <0.6 | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - |
| Scheduled chemicals (NSW Waste 2014) | mg/kg | | 49.999 | 49.999 | | | | <2.3 | <1 | <1 | <1 | - | <2.3 | <2.3 | - | - | - | - | - |
| Asbestos | | | | | | | | | | | | | | | | | | | |
| Asbestos Identification | g/kg | 0.1 | | | | | | - | - | - | - | - | - | - | - | ND | D | ND | - |

| Analyte / Field_ID | 301/0.2 | 301/0.4 | D3 - 3-3-20 | T2 -3-3-20 | 301/0.7 | 302/F1 | 302/0.3 | 303/0.2 | 304/0.2 | 306/0.5 | 307/F1 | 307/F1S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LocCode | 301 | 301 | 301 | 301 | 301 | 302 | 302 | 303 | 304 | 306 | 307 | 307 |
| Fill (F) / Natural (N) | F | F | F | F | N | F | F | F | F | N | F | F |
| Sample Depth | 0.2 | 0.4 | 0.4 | 0.4 | 0.7 | 0.5 | 0.3 | 0.2 | 0.2 | 0.5 | | |
| Sample Date | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 |
| **Coal Tar Identification** | - | - | - | - | - | - | - | - | - | - | - | - |
| Metals | | | | | | | | | | | | |
| Aluminium | 5400 | 3300 | 2700 | 3320 | 1400 | - | 3400 | 11000 | 2600 | 18000 | - | - |
| Antimony | <7 | <7 | <7 | <5 | <7 | - | <7 | <7 | <7 | <7 | - | - |
| Arsenic | <4 | <4 | <4 | <5 | <4 | - | <4 | 5 | <4 | 10 | - | - |
| Boron | <3 | <3 | <3 | <50 | <3 | - | <3 | <3 | <3 | <3 | - | - |
| Cadmium | 1 | <0.4 | <0.4 | <1 | <0.4 | - | <0.4 | <0.4 | <0.4 | <0.4 | - | - |
| Chromium (III+VI) | 15 | 7 | 5 | 7 | 2 | - | 4 | 12 | 4 | 23 | - | - |
| Cobalt | 5 | 1 | 1 | <2 | <1 | - | 2 | 2 | 2 | <1 | - | - |
| Copper | 140 | 26 | 16 | 26 | 8 | - | 15 | 10 | 15 | 3 | - | - |
| Iron | 8700 | 6000 | 5500 | 6660 | 2700 | - | 8400 | 14000 | 4600 | 36000 | - | - |
| Lead | 670 | 190 | 54 | 163 | 14 | - | 75 | 68 | 44 | 10 | - | - |
| Magnesium | 1200 | 610 | 490 | 500 | 270 | - | 310 | 410 | 260 | 780 | - | - |
| Manganese | 290 | 60 | 34 | 56 | 19 | - | 140 | 130 | 53 | 6 | - | - |
| Mercury | 0.4 | 1.4 | 0.3 | 0.3 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | - | - |
| Nickel | 9 | 5 | 3 | 5 | 1 | - | 4 | 5 | 3 | 2 | - | - |
| Selenium | <2 | <2 | <2 | <5 | <2 | - | <2 | <2 | <2 | <4 | - | - |
| Tin | 3 | 1 | <1 | <5 | <1 | - | 1 | 1 | <1 | <1 | - | - |
| Zinc | 470 | 110 | 39 | 150 | 14 | - | 89 | 50 | 46 | 4 | - | - |
| TRH | | | | | | | | | | | | |
| C10-C16 | <50 | - | - | - | - | - | <50 | <50 | <50 | <50 | - | - |
| C16-C34 | 190 | - | - | - | - | - | <100 | <100 | <100 | <100 | - | - |
| C34-C40 | <100 | - | - | - | - | - | <100 | <100 | <100 | <100 | - | - |
| F2-NAPHTHALENE | <50 | - | - | - | - | - | <50 | <50 | <50 | <50 | - | - |
| C6 - C9 | <25 | - | - | - | - | - | <25 | <25 | <25 | <25 | - | - |
| C10 - C14 | <50 | - | - | - | - | - | <50 | <50 | <50 | <50 | - | - |
| C15 - C28 | 120 | - | - | - | - | - | <100 | <100 | <100 | <100 | - | - |
| C29-C36 | 100 | - | - | - | - | - | <100 | <100 | <100 | <100 | - | - |
| +C10 - C36 (Sum of total) | 245 | - | - | - | - | - | <250 | <250 | <250 | <250 | - | - |
| C10 - C40 (Sum of total) | 190 | - | - | - | - | - | <50 | <50 | <50 | <50 | - | - |
| C6-C10 less BTEX (F1) | <25 | - | - | - | - | - | <25 | <25 | <25 | <25 | - | - |
| C6-C10 | <25 | - | - | - | - | - | <25 | <25 | <25 | <25 | - | - |
| BTEX | | | | | | | | | | | | |
| Benzene | <0.2 | - | - | - | - | - | <0.2 | <0.2 | <0.2 | <0.2 | - | - |
| Ethylbenzene | <1 | - | - | - | - | - | <1 | <1 | <1 | <1 | - | - |
| Toluene | <0.5 | - | - | - | - | - | <0.5 | <0.5 | <0.5 | <0.5 | - | - |
| Xylene (m & p) | <2 | - | - | - | - | - | <2 | <2 | <2 | <2 | - | - |
| Xylene (o) | <1 | - | - | - | - | - | <1 | <1 | <1 | <1 | - | - |
| Xylene Total | <3 | - | - | - | - | - | <3 | <3 | <3 | <3 | - | - |
| MAH | | | | | | | | | | | | |
| 1,2,4-trimethylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,3,5-trimethylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Isopropylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| n-butylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| n-propylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| p-isopropyltoluene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| sec-butylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Styrene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| tert-butylbenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Chlorinated Hydrocarbons | | | | | | | | | | | | |
| 1,1,1,2-tetrachloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,1,1-trichloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,1,2,2-tetrachloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,1,2-trichloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,1-dichloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,1-dichloroethene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,1-dichloropropene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,2,3-trichloropropane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,2-dibromo-3-chloropropane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,2-dichloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,2-dichloropropane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,3-dichloropropane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 2,2-dichloropropane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Bromochloromethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Bromodichloromethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Bromoform | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Carbon tetrachloride | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Chlorodibromomethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Chloroethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Chloroform | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Chloromethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| cis-1,2-dichloroethene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| cis-1,3-dichloropropene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Dibromomethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Hexachlorobutadiene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Trichloroethene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Tetrachloroethene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| trans-1,2-dichloroethene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| trans-1,3-dichloropropene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Vinyl chloride | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Halogenated Hydrocarbons | | | | | | | | | | | | |
| 1,2-dibromoethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Bromomethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Dichlorodifluoromethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Trichlorofluoromethane | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Halogenated Benzenes | | | | | | | | | | | | |
| 1,2,3-trichlorobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,2,4-trichlorobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,2-dichlorobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,3-dichlorobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 1,4-dichlorobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 2-chlorotoluene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| 4-chlorotoluene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Bromobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Chlorobenzene | - | - | - | - | - | - | <1 | - | - | - | - | - |
| Hexachlorobenzene | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Solvents | | | | | | | | | | | | |
| Cyclohexane | - | - | - | - | - | - | - | - | - | - | - | - |
| PAH/Phenols | | | | | | | | | | | | |
| Total Positive PAHs | 39 | 12 | 10 | 21.8 | 0.1 | - | 4.4 | 6.4 | 1.8 | <0.05 | - | - |
| Acenaphthene | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | - | - |
| Acenaphthylene | 0.6 | 0.2 | 0.2 | 0.6 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | - | - |
| Anthracene | 0.7 | 0.2 | 0.2 | 0.8 | <0.1 | - | 0.1 | 0.2 | <0.1 | <0.1 | - | - |
| Benz(a)anthracene | 3.5 | 1.3 | 1.2 | 2.1 | <0.1 | - | 0.4 | 0.7 | 0.2 | <0.1 | - | - |
| Benzo(a) pyrene | 3.2 | 1.1 | 0.88 | 1.8 | <0.05 | - | 0.4 | 0.54 | 0.2 | <0.05 | - | - |
| Benzo(a)pyrene TEQ calc (zero) | 4.8 | 1.7 | 1.3 | 2.4 | <0.5 | - | 0.5 | 0.7 | <0.5 | <0.5 | - | - |
| Benzo(a)pyrene TEQ calc(half) | 4.8 | 1.7 | 1.3 | 2.7 | <0.5 | - | 0.6 | 0.8 | <0.5 | <0.5 | - | - |
| Benzo(a)pyrene TEQ calc(PQL) | 4.8 | 1.7 | 1.3 | 2.9 | <0.5 | - | 0.6 | 0.8 | <0.5 | <0.5 | - | - |
| Benzo(b,j+k)fluoranthene | 5.6 | 2 | 2 | 3.1 | <0.2 | - | 0.7 | 1 | 0.3 | <0.2 | - | - |
| Benzo(g,h,i)perylene | 1.7 | 0.5 | 0.4 | 1 | <0.1 | - | 0.2 | 0.2 | <0.1 | <0.1 | - | - |
| Chrysene | 3.2 | 1.2 | 1 | 1.8 | <0.1 | - | 0.4 | 0.6 | 0.2 | <0.1 | - | - |
| Dibenz(a,h)anthracene | 0.4 | 0.1 | 0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | - | - |
| Fluoranthene | 7.4 | 2.1 | 1.9 | 4.6 | 0.1 | - | 0.8 | 1.3 | 0.4 | <0.1 | - | - |
| Fluorene | 0.4 | <0.1 | <0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | - | - |
| Indeno(1,2,3-c,d)pyrene | 1.7 | 0.5 | 0.4 | 0.9 | <0.1 | - | 0.2 | 0.2 | <0.1 | <0.1 | - | - |
| Naphthalene | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | - | <0.1 | <0.1 | <0.1 | <0.1 | - | - |
| Phenanthrene | 4 | 1 | 0.9 | 2.3 | <0.1 | - | 0.5 | 0.6 | 0.2 | <0.1 | - | - |
| Phenolics Total | - | - | - | - | - | - | <5 | - | - | - | - | - |
| Pyrene | 6.4 | 1.8 | 1.6 | 4 | <0.1 | - | 0.8 | 1 | 0.4 | <0.1 | - | - |
| Polychlorinated biphenyls | | | | | | | | | | | | |
| PCBs (Sum of total) | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1016 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1221 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1232 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1242 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1248 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1254 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Arochlor 1260 | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Organochlorine pesticides | | | | | | | | | | | | |
| Endosulfan | - | - | - | - | - | - | <0.3 | - | - | - | - | - |
| 4,4-DDE | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| a-BHC | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Aldrin | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Aldrin + Dieldrin | - | - | - | - | - | - | <0.2 | - | - | - | - | - |
| b-BHC | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Chlordane (cis) | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Chlordane (trans) | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| d-BHC | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| DDD | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| DDT | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| DDT+DDE+DDD | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Dieldrin | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Endosulfan I | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Endosulfan II | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Endosulfan sulphate | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Endrin | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Endrin aldehyde | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| g-BHC (Lindane) | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Heptachlor | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Heptachlor epoxide | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Methoxychlor | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Organophosphorous Pesticides | | | | | | | | | | | | |
| Azinophos methyl | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Bromophos-ethyl | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Chlorpyrifos | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Chlorpyrifos-methyl | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Diazinon | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Dichlorvos | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Dimethoate | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Ethion | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Fenitrothion | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Malathion | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Parathion | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Ronnel | - | - | - | - | - | - | <0.1 | - | - | - | - | - |
| Pesticides | | | | | | | | | | | | |
| Moderately Harmful Pesticides (total) | - | - | - | - | - | - | <0.6 | - | - | - | - | - |
| Pesticides (total, NSW Waste 2014) | - | - | - | - | - | - | <0.6 | - | - | - | - | - |
| Scheduled chemicals (NSW Waste 2014) | - | - | - | - | - | - | <2.3 | - | - | - | - | - |
| Asbestos | | | | | | | | | | | | |
| Asbestos Identification | ND | - | - | - | - | D | ND | - | ND | - | ND | ND |

| Analyte / Field_ID | 307/F2 | 307/F2S | 308/0.1 | 309/0.3 | 309/0.5 | 310/F1 | 310/0.2 | S1 | S2 | 55499_BH1 | 55499_BH4 | 55499_BH5 | 55499_BH6 | 55499_BH7 | 55499_BH8 | 55499_BH9 | 55499_BH10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LocCode | 307 | 307 | 308 | 309 | 309 | 310 | 310 | Stockpile B | Stockpile B | BH1 | BH4 | BH5 | BH6 | BH7 | BH8 | BH9 | BH10 |
| Fill (F) / Natural (N) | F | F | F | F | N | F | N | F | F | F | F | F | F | F | F | F | F |
| Sample Depth | | | 0.1 | 0.3 | 0.5 | 0.05 | 0.2 | | | 0.3 | 0.5 | 0.1 | 0.5 | 0.1 | 0.1 | 0.6 | 0.4 |
| Sample Date | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 3/03/2020 | 12/03/2020 | 12/03/2020 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 | 22/09/2016 |
| **Coal Tar Identification** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Metals | | | | | | | | | | | | | | | | | |
| Aluminium | - | - | 5700 | 5800 | 9500 | - | 9400 | 10000 | 6600 | - | - | - | - | - | - | - | - |
| Antimony | - | - | <7 | <7 | <7 | - | <7 | <7 | <7 | - | - | - | - | - | - | - | - |
| Arsenic | - | - | <4 | 7 | 6 | - | 5 | 8 | 5 | 5 | <4 | 7 | <4 | <4 | <4 | 4 | 5 |
| Boron | - | - | 4 | <3 | 4 | - | <3 | <3 | <3 | - | - | - | - | - | - | - | - |
| Cadmium | - | - | <0.4 | <0.4 | <0.4 | - | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 | 2 | <0.4 | <0.4 | <0.4 | <0.4 | <0.4 |
| Chromium (III+VI) | - | - | 11 | 9 | 12 | - | 15 | 11 | 7 | 9 | 9 | 27 | 10 | 17 | 18 | 9 | 22 |
| Cobalt | - | - | 3 | 11 | 15 | - | <1 | 2 | <1 | - | - | - | - | - | - | - | - |
| Copper | - | - | 30 | 18 | 360 | - | <1 | 14 | 7 | 19 | 17 | 420 | 10 | 65 | 20 | 39 | 9 |
| Iron | - | - | 7800 | 17000 | 13000 | - | 17000 | 23000 | 14000 | - | - | - | - | - | - | - | - |
| Lead | - | - | 19 | 50 | 180 | - | 5 | 44 | 22 | 58 | 40 | 1400 | 8 | 38 | 25 | 70 | 14 |
| Magnesium | - | - | 1800 | 1700 | 2100 | - | 380 | 1200 | 650 | - | - | - | - | - | - | - | - |
| Manganese | - | - | 270 | 500 | 1100 | - | 3 | 580 | 210 | - | - | - | - | - | - | - | - |
| Mercury | - | - | <0.1 | <0.1 | 0.2 | - | <0.1 | 0.2 | 0.1 | 0.2 | <0.1 | 0.2 | <0.1 | <0.1 | <0.1 | 0.4 | <0.1 |
| Nickel | - | - | 6 | 13 | 11 | - | <1 | 4 | 2 | 4 | 4 | 15 | 4 | 16 | 19 | 7 | 3 |
| Selenium | - | - | <2 | <2 | <2 | - | <2 | <2 | <2 | - | - | - | - | - | - | - | - |
| Tin | - | - | <1 | <1 | 3 | - | <1 | 3 | 1 | - | - | - | - | - | - | - | - |
| Zinc | - | - | 58 | 85 | 280 | - | 2 | 58 | 31 | 48 | 39 | 1100 | 35 | 210 | 75 | 85 | 13 |
| TRH | | | | | | | | | | | | | | | | | |
| C10-C16 | - | - | <50 | <50 | <50 | - | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| C16-C34 | - | - | <100 | <100 | 220 | - | <100 | <100 | <100 | 120 | <100 | 240 | <100 | <100 | <100 | 340 | <100 |
| C34-C40 | - | - | <100 | <100 | 150 | - | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| F2-NAPHTHALENE | - | - | <50 | <50 | <50 | - | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| C6 - C9 | - | - | <25 | <25 | <25 | - | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| C10 - C14 | - | - | <50 | <50 | <50 | - | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| C15 - C28 | - | - | <100 | <100 | 130 | - | <100 | <100 | <100 | <100 | <100 | 160 | <100 | <100 | <100 | 240 | <100 |
| C29-C36 | - | - | <100 | <100 | 130 | - | <100 | <100 | <100 | <100 | <100 | 120 | <100 | <100 | <100 | 330 | <100 |
| +C10 - C36 (Sum of total) | - | - | <250 | <250 | 285 | - | <250 | <250 | <250 | <250 | <250 | 305 | <250 | <250 | <250 | 395 | <250 |
| C10 - C40 (Sum of total) | - | - | <50 | <50 | 360 | - | <50 | <50 | <50 | - | - | - | - | - | - | - | - |
| C6-C10 less BTEX (F1) | - | - | <25 | <25 | <25 | - | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| C6-C10 | - | - | <25 | <25 | <25 | - | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| BTEX | | | | | | | | | | | | | | | | | |
| Benzene | - | - | <0.2 | <0.2 | <0.2 | - | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Ethylbenzene | - | - | <1 | <1 | <1 | - | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Toluene | - | - | <0.5 | <0.5 | <0.5 | - | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Xylene (m & p) | - | - | <2 | <2 | <2 | - | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 | <2 |
| Xylene (o) | - | - | <1 | <1 | <1 | - | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| Xylene Total | - | - | <3 | <3 | <3 | - | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 | <3 |
| MAH | | | | | | | | | | | | | | | | | |
| 1,2,4-trimethylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,3,5-trimethylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Isopropylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| n-butylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| n-propylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| p-isopropyltoluene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| sec-butylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Styrene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| tert-butylbenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chlorinated Hydrocarbons | | | | | | | | | | | | | | | | | |
| 1,1,1,2-tetrachloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1,1-trichloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1,2,2-tetrachloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1,2-trichloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1-dichloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1-dichloroethene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,1-dichloropropene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2,3-trichloropropane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dibromo-3-chloropropane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dichloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dichloropropane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,3-dichloropropane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 2,2-dichloropropane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromochloromethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromodichloromethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromoform | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Carbon tetrachloride | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chlorodibromomethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chloroethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chloroform | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chloromethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| cis-1,2-dichloroethene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| cis-1,3-dichloropropene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Dibromomethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Hexachlorobutadiene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Trichloroethene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Tetrachloroethene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| trans-1,2-dichloroethene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| trans-1,3-dichloropropene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Vinyl chloride | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Halogenated Hydrocarbons | | | | | | | | | | | | | | | | | |
| 1,2-dibromoethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromomethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Dichlorodifluoromethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Trichlorofluoromethane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Halogenated Benzenes | | | | | | | | | | | | | | | | | |
| 1,2,3-trichlorobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2,4-trichlorobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,2-dichlorobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,3-dichlorobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 1,4-dichlorobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 2-chlorotoluene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| 4-chlorotoluene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Bromobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Chlorobenzene | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| Hexachlorobenzene | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Solvents | | | | | | | | | | | | | | | | | |
| Cyclohexane | - | - | - | - | - | - | - | <1 | <1 | - | - | - | - | - | - | - | - |
| PAH/Phenols | | | | | | | | | | | | | | | | | |
| Total Positive PAHs | - | - | 7 | 4.8 | 25 | - | <0.05 | 8 | 6.9 | 50 | 1.3 | 62 | 3.7 | <0.05 | 0.58 | 61 | 19 |
| Acenaphthene | - | - | <0.1 | <0.1 | <0.1 | - | <0.1 | <0.1 | <0.1 | 0.1 | <0.1 | 0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Acenaphthylene | - | - | <0.1 | <0.1 | 0.3 | - | <0.1 | <0.1 | <0.1 | 0.6 | <0.1 | 1.2 | <0.1 | <0.1 | <0.1 | 1.3 | 0.4 |
| Anthracene | - | - | 0.1 | 0.1 | 0.5 | - | <0.1 | 0.3 | 0.4 | 1.6 | <0.1 | 1.4 | <0.1 | <0.1 | <0.1 | 2.1 | 0.6 |
| Benz(a)anthracene | - | - | 0.6 | 0.5 | 2.4 | - | <0.1 | 0.6 | 0.6 | 4.3 | 0.1 | 4.5 | 0.2 | <0.1 | <0.1 | 6.3 | 1.5 |
| Benzo(a) pyrene | - | - | 0.5 | 0.4 | 2.2 | - | <0.05 | 0.53 | 0.4 | 3.6 | 0.1 | 4.7 | 0.3 | <0.05 | 0.1 | 5 | 1.4 |
| Benzo(a)pyrene TEQ calc (zero) | - | - | 0.7 | 0.5 | 3.1 | - | <0.5 | 0.7 | 0.6 | 5.2 | <0.5 | 6.8 | <0.5 | <0.5 | <0.5 | 7.3 | 2 |
| Benzo(a)pyrene TEQ calc(half) | - | - | 0.7 | 0.6 | 3.1 | - | <0.5 | 0.8 | 0.6 | 5.2 | <0.5 | 6.8 | <0.5 | <0.5 | <0.5 | 7.3 | 2 |
| Benzo(a)pyrene TEQ calc(PQL) | - | - | 0.8 | 0.6 | 3.1 | - | <0.5 | 0.8 | 0.7 | 5.2 | <0.5 | 6.8 | <0.5 | <0.5 | <0.5 | 7.3 | 2 |
| Benzo(b,j+k)fluoranthene | - | - | 0.9 | 0.7 | 3.5 | - | <0.2 | 0.9 | 0.7 | 6 | 0.2 | 7.8 | 0.5 | <0.2 | <0.2 | 7.9 | 2.2 |
| Benzo(g,h,i)perylene | - | - | 0.3 | 0.2 | 1 | - | <0.1 | 0.3 | 0.3 | 1.9 | <0.1 | 2.7 | 0.2 | <0.1 | <0.1 | 1.8 | 0.6 |
| Chrysene | - | - | 0.5 | 0.4 | 2.1 | - | <0.1 | 0.6 | 0.5 | 3.9 | 0.1 | 4.7 | 0.3 | <0.1 | 0.1 | 5.4 | 1.4 |
| Dibenz(a,h)anthracene | - | - | <0.1 | <0.1 | 0.2 | - | <0.1 | <0.1 | <0.1 | 0.3 | <0.1 | 0.5 | <0.1 | <0.1 | <0.1 | 0.6 | 0.1 |
| Fluoranthene | - | - | 1.7 | 1 | 5 | - | <0.1 | 1.6 | 1.5 | 9.9 | 0.3 | 12 | 0.8 | <0.1 | 0.2 | 11 | 3.6 |
| Fluorene | - | - | <0.1 | <0.1 | 0.3 | - | <0.1 | 0.1 | 0.1 | 0.2 | <0.1 | 0.4 | <0.1 | <0.1 | <0.1 | 0.3 | 0.1 |
| Indeno(1,2,3-c,d)pyrene | - | - | 0.3 | 0.2 | 1 | - | <0.1 | 0.3 | 0.2 | 2.1 | <0.1 | 3 | 0.2 | <0.1 | <0.1 | 2.2 | 0.8 |
| Naphthalene | - | - | <0.1 | <0.1 | <0.1 | - | <0.1 | <0.1 | <0.1 | <1 - 0.1 | <0.1 | <1 - 0.2 | <0.1 | <0.1 | <0.1 | <1 - 0.3 | <0.1 |
| Phenanthrene | - | - | 0.6 | 0.4 | 2.6 | - | <0.1 | 1.2 | 1 | 6.7 | 0.1 | 7.8 | 0.4 | <0.1 | <0.1 | 6.5 | 2.6 |
| Phenolics Total | - | - | - | - | - | - | - | <5 | <5 | - | - | - | - | - | - | - | - |
| Pyrene | - | - | 1.5 | 0.8 | 4.4 | - | <0.1 | 1.4 | 1.2 | 8.9 | 0.3 | 11 | 0.8 | <0.1 | 0.2 | 10 | 3.3 |
| Polychlorinated biphenyls | | | | | | | | | | | | | | | | | |
| PCBs (Sum of total) | - | - | - | - | - | - | - | <0.1 | <0.1 | - | - | - | - | - | - | - | - |
| Arochlor 1016 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1221 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1232 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1242 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1248 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1254 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Arochlor 1260 | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.5 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Organochlorine pesticides | | | | | | | | | | | | | | | | | |
| Endosulfan | - | - | - | - | - | - | - | <0.3 | <0.3 | - | - | - | - | - | - | - | - |
| 4,4-DDE | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| a-BHC | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aldrin | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Aldrin + Dieldrin | - | - | - | - | - | - | - | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| b-BHC | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlordane (cis) | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlordane (trans) | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| d-BHC | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| DDD | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| DDT | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| DDT+DDE+DDD | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| Dieldrin | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan I | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan II | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endosulfan sulphate | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endrin | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Endrin aldehyde | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| g-BHC (Lindane) | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Heptachlor | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Heptachlor epoxide | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Methoxychlor | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Organophosphorous Pesticides | | | | | | | | | | | | | | | | | |
| Azinophos methyl | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Bromophos-ethyl | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorpyrifos | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chlorpyrifos-methyl | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Diazinon | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dichlorvos | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Dimethoate | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ethion | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Fenitrothion | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Malathion | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Parathion | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Ronnel | - | - | - | - | - | - | - | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Pesticides | | | | | | | | | | | | | | | | | |
| Moderately Harmful Pesticides (total) | - | - | - | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - | - | - | - |
| Pesticides (total, NSW Waste 2014) | - | - | - | - | - | - | - | <0.6 | <0.6 | - | - | - | - | - | - | - | - |
| Scheduled chemicals (NSW Waste 2014) | - | - | - | - | - | - | - | <2.3 | <2.3 | - | - | - | - | - | - | - | - |
| Asbestos | | | | | | | | | | | | | | | | | |
| Asbestos Identification | D | ND | ND | ND | - | D | - | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |

Notes to Table:
D - Detected
ND - Not Detected at laboratory reporting limit

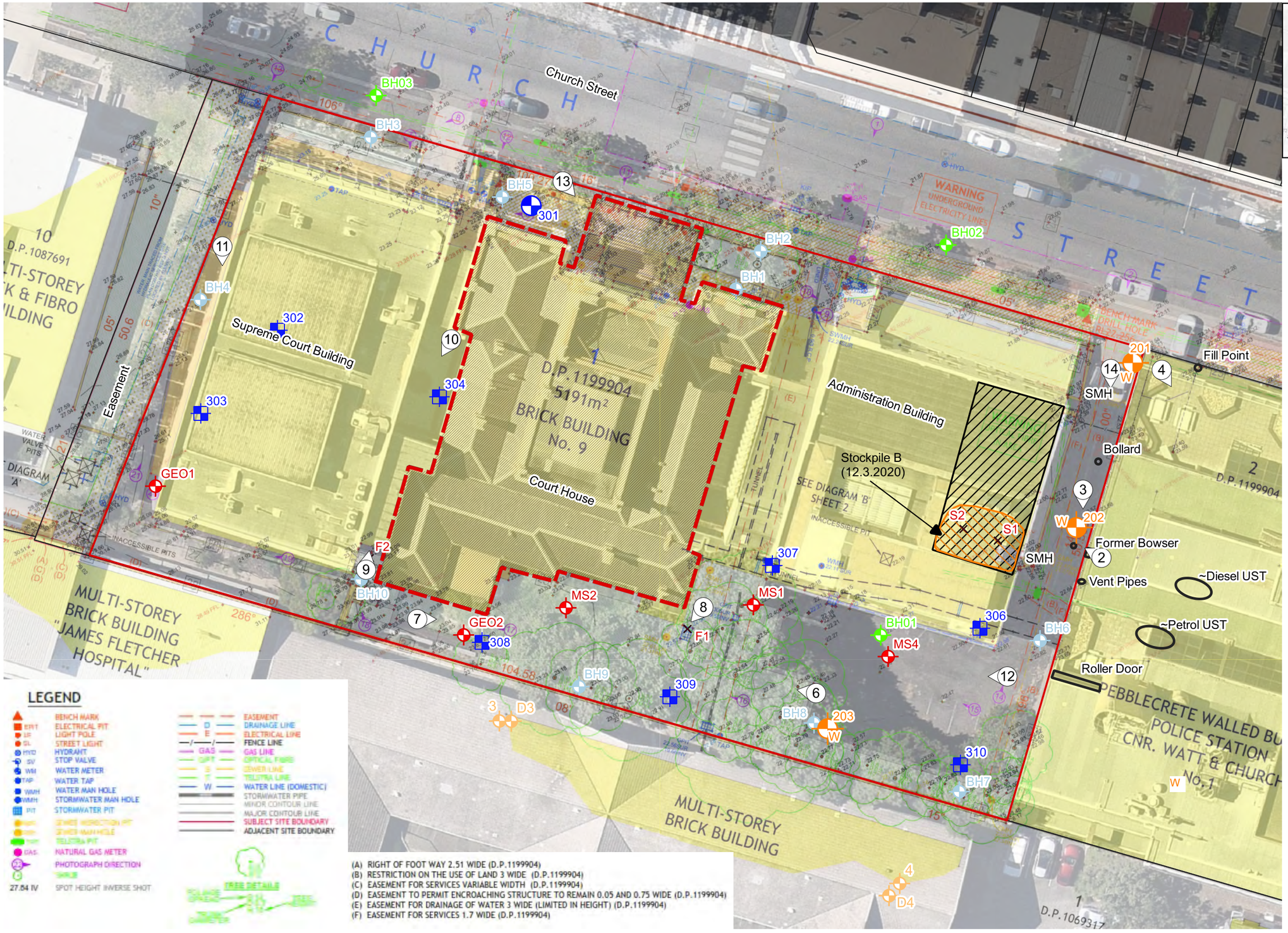
## Table 12: Results of Leachability Analysis

| Sample ID | PID (ppm) | Metals | | | PAHs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Lead (Pb) | | | Total PAH | | | Benzo(a)pyrene | | |
| | | Total | TCLP | ASLP | Total | TCLP | ASLP | Total | TCLP | ASLP |
| | | (mg/kg) | (mg/L) | (mg/L) | (mg/kg) | (mg/L) | (mg/L) | (mg/kg) | (mg/L) | (mg/L) |
| 203/0.5 | <1 | 100 | 0.03 | - | 20 | NIL (+)VE | - | 1.8 | <0.001 | - |
| D3 (203/0.5) | <1 | 240 | | | 77 | | | 6.4 | | |
| MS4 / 0.2 | | 4 | - | - | 100 | 0.064 | - | 4.6 | <0.001 | - |
| 301/0.05 | <1 | 770 | 0.08 | 0.041 | 23 | NIL (+)VE | <0.001 each | 2.1 | <0.001 | <0.001 |
| **Laboratory PQL** | | 1 | 0.1 | 0.001 | 0.05 | 0.001 | 0.001 | 0.05 | 0.001 | 0.001 |
| **NSW EPA 2014 - Waste Classification Guidelines** | **General Solid Waste** | 1500 (1) | 5 | NC | 200 | NC | NC | 10 (1) | 0.04 | NC |
| | **Restricted Solid Waste** | 6000 (1) | 20 | NC | 800 | NC | NC | 23 (1) | 0.16 | NC |
| **ANZG (2018) - MW 95%** | **Marine** | NC | NC | 0.0044 | NC | NC | NC | NC | NC | 0.0001 |

Notes to Table:
Total concentrations in mg/kg on a dry weight basis
TCLP and ASLP concentrations in mg/L
(1) - Waste Classification Criteria for Total Concentrations when used with TCLP Results
PQL - practical quantitation limit
NC - No Criteria
- Not Tested
TCLP - standard NSW EPA acid leaching test
ASTM - TCLP test using distilled water as extracting fluid
(L) - 95% Low Reliability Trigger Values (99% protection level applied where recommended (ie benzo(a)pyrene))
Shaded Results Exceed Criteria Shaded

# Appendix B

Drawing 1 – Test Location Plan
Drawing 2 – Concept Schematic for Proposed Capping Strategy
Drawings supplied by client:
ADW Johnson Detailed Survey of Lot 1 DP 1199904 (Ref 239815-DET-001-A dated 10.09.18)
Azusa Sekkei – General Arrangement Site Development Plan (A-017), Sections (A-209 to A-211) and Demolition Plan (A-018)
Cardno Stormwater Diversion Plans (CI-310, CI-312 and CI-315)
Moir Landscape Architecture Plans LP00 to LP16 (Ref 1691 dated 6/4/2020)



Site Location

## Legend

- Approximate Stockpile Area
- Approximate Excavation Area
- Environmental Pit Location Post-Demolition (DP)
- Environmental Bore Location Post-Demolition (DP)
- Environmental Bore Location Pre-Demolition (DP)
- W Environmental Well Location
- Geotechnical Test Location Pre-Demolition (DP)
- Previous Test Locations (Prensa 2016)
- Previous Test Locations (Cardno 2018)
- Site Boundary
- Proposed Buildings Structures to be Retained
- × Approximate Location of Material Sample Grab Sample
- Approximate Figure & Orientation Location

0 10 20 30 40 m

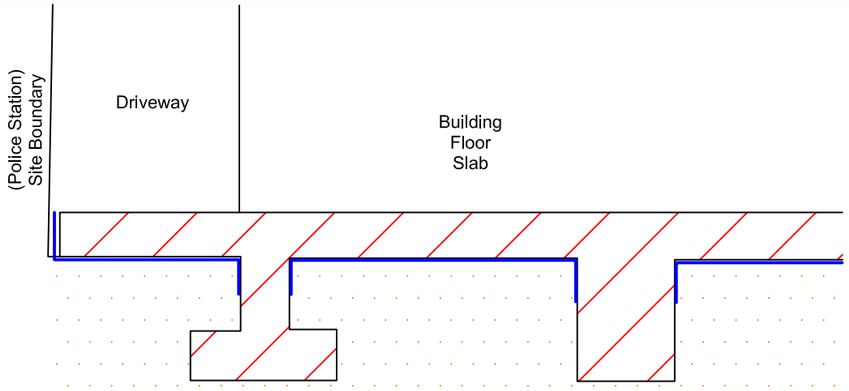
Drawing adapted from Nearmap Image dated 22.10.2019, plan by ADW Johnson ref 239815-DET-001-A dated 10.09.2018, and plan by Prensa ref 55499 Figures, Figure 2, Rev 1 dated 07.10.2016.

**Douglas Partners**
Geotechnics / Environment / Groundwater

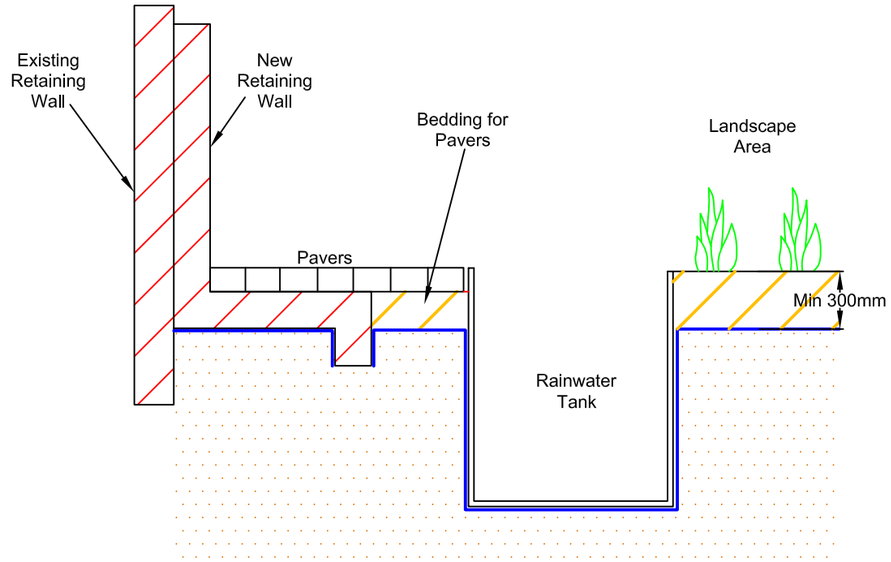
| | | | |
|---|---|---|---|
| CLIENT: | Nihon Daigaku Australia Newcastle Pty Ltd | TITLE: | **Test Location Plan** |
| OFFICE: | Newcastle | DRAWN BY: PLH | **Proposed Nihon University** |
| SCALE: | 1:400 @ A3 | DATE: 18.March.2020 | **9 Church Street, Newcastle** |

N

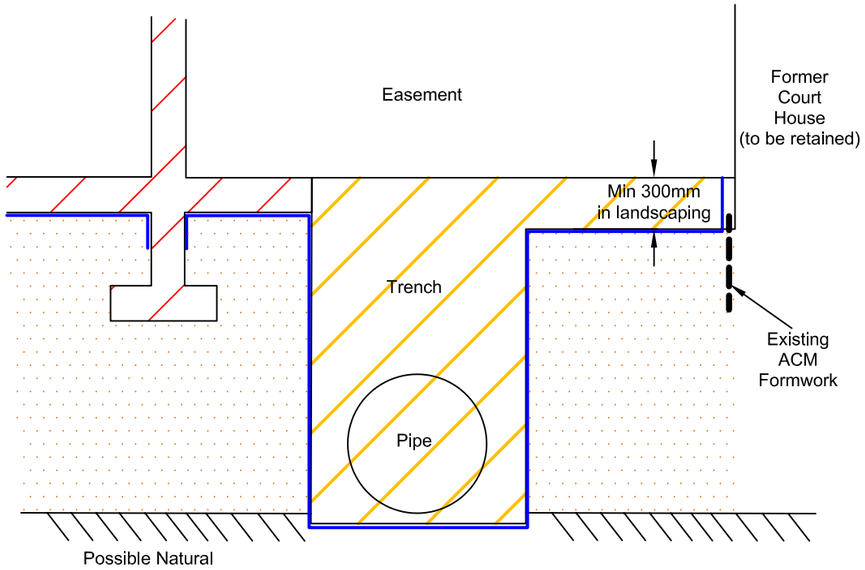
| | |
|---|---|
| PROJECT No: | 91667.02 |
| DRAWING No: | 1 |
| REVISION: | 2 |



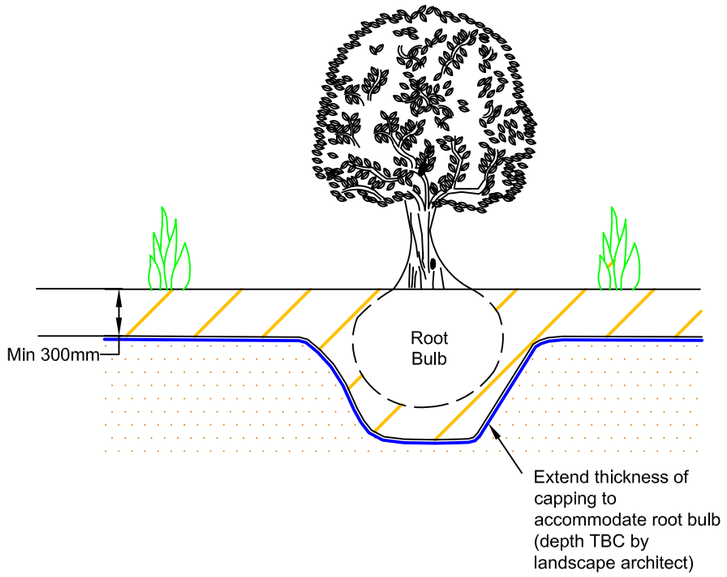

Proposed Driveway / Building Slab




Proposed Retaining Wall / Water Tank / Landscaping Area




Stormwater Easement




Proposed Trees / Deep Rooted Vegetation

**LEGEND**

VENM, ENM or relevant RRO/RRE material utilised as 'clean' capping. Minimum 300mm in landscape areas. Increased thickness to accommodate vegetation root bulbs where required (TBC by landscape architect). Thickness to engineers specification for pavements (ie bedding for pavers).

Marker / separation layer. Hi-visibility orange geofabric (Bidum A34 or similar). Plastic can be used beneath concrete pavements / slabs as al alternative.

Concrete slab / pavement

Potential ACM impacted filling

Refer to RAP for details (91667.02.R.004.Rev1)

| | | | | |
|---|---|---|---|---|
| Douglas Partners<br>Geotechnics / Environment / Groundwater | CLIENT: Nihon Daigaku Australia Newcastle Pty Ltd | TITLE: **Concept Schematic for Proposed Capping Strategy** | PROJECT No: 91667.02 | |
| | OFFICE: Newcastle / DRAWN BY: PLH | **Proposed Nihon University** | DRAWING No: 2 | |
| | SCALE: NTS / DATE: 23.04.2020 | **9 Church Street, Newcastle** | REVISION: 0 | |

239815-DET-001-A

DIAL 1100 BEFORE YOU DIG

C H U R C H  S T R E E T

WARNING UNDERGROUND ELECTRICITY LINES

BENCH MARK DRILL HOLE RL22.256

WARNING OPTICAL FIBRE IN AREA

10
D.P.1087691
MULTI-STOREY BRICK & FIBRO BUILDING

1
D.P.1199904
5191m²
BRICK BUILDING No. 9

2
D.P.1199904

SEE DIAGRAM 'B' SHEET 2

INACCESSIBLE PIT

TUNNEL

PEBBLECRETE WALLED BUILDING
POLICE STATION
CNR. WATT & CHURCH
No.1

WATER VALVE PITS

SEE DIAGRAM 'A'

INACCESSIBLE PITS

MULTI-STOREY BRICK BUILDING "JAMES FLETCHER HOSPITAL"

MULTI-STOREY BRICK BUILDING

1
D.P.1069317

BRICK

N

adw johnson

## LEGEND

- BENCH MARK
- EPIT ELECTRICAL PIT
- LP LIGHT POLE
- SL STREET LIGHT
- HYD HYDRANT
- SV STOP VALVE
- WM WATER METER
- TAP WATER TAP
- WMH WATER MAN HOLE
- WMH STORMWATER MAN HOLE
- PIT STORMWATER PIT
- INSP SEWER INSPECTION PIT
- SMH SEWER MAN HOLE
- TPIT TELSTRA PIT
- GAS NATURAL GAS METER
- 22 PHOTOGRAPH DIRECTION
- SHRUB
- 27.84 IV SPOT HEIGHT INVERSE SHOT
- EASEMENT
- D DRAINAGE LINE
- E ELECTRICAL LINE
- FENCE LINE
- GAS GAS LINE
- OPT OPTICAL FIBRE
- S SEWER LINE
- T TELSTRA LINE
- W WATER LINE (DOMESTIC)
- STORMWATER PIPE
- MINOR CONTOUR LINE
- MAJOR CONTOUR LINE
- SUBJECT SITE BOUNDARY
- ADJACENT SITE BOUNDARY

TREE DETAILS
FOLIAGE SPREAD S:12
TRUNK DIAMETER D:0.5
TREE HEIGHT H:18

(A) RIGHT OF FOOT WAY 2.51 WIDE (D.P.1199904)
(B) RESTRICTION ON THE USE OF LAND 3 WIDE (D.P.1199904)
(C) EASEMENT FOR SERVICES VARIABLE WIDTH (D.P.1199904)
(D) EASEMENT TO PERMIT ENCROACHING STRUCTURE TO REMAIN 0.05 AND 0.75 WIDE (D.P.1199904)
(E) EASEMENT FOR DRAINAGE OF WATER 3 WIDE (LIMITED IN HEIGHT) (D.P.1199904)
(F) EASEMENT FOR SERVICES 1.7 WIDE (D.P.1199904)

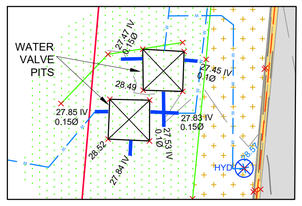



DIAGRAM 'A'
SCALE 1:100

NOTES:-

1. SERVICES HAVE BEEN LOCATED WHERE VISIBLE ONLY. PRIOR TO EXCAVATION OR CONSTRUCTION ALL SERVICES ARE TO BE LOCATED BY THE RELEVANT AUTHORITY.
2. SPOT LEVELS AND CONTOURS SHOWN HEREON ARE FOR DESIGN PURPOSES ONLY AND ARE TO BE CONFIRMED ON SITE PRIOR TO ANY EXCAVATION OR CONSTRUCTION.
3. THIS PLAN HAS BEEN PREPARED FOR THE PURPOSE OF DETAIL SURVEY AND SHOULD NOT BE USED FOR ANYTHING OTHER THAN THAT PURPOSE.

| ver. | date | comment | surveyed | drawn | checked | pm |
|---|---|---|---|---|---|---|
| A | 10.09.18 | INITIAL ISSUE | CD | LB/MC | CD | TC |

co-ordinate information: CO-ORDINATE SYSTEM: MGA 56; ORIGIN OF CO-ORDINATES: P.M. 19805; DATE OF SURVEY 30.08.18

level information: DATUM: AHD; ORIGIN OF LEVELS: P.M. 190805; CONTOUR INTERVAL: 0.5

scale (A1 original size): 0 5.0 10.0m SCALE: 1:200 (FULL)

page: 1 OF 2

drawing title: Detail Survey of Lot 1 D.P. 1199904

location: 9 Church Street, Newcastle

council: Newcastle

dwg ref: 239815-DET-001-A

client: AZUSA SEKKEI CO LTD

adw johnson

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au

• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design

working beyond expectations

Plotted By: Anthony Morgan Plot Date: 10/09/18 3:25:01 PM Cad File: N:\239815\DWG'S\SURVEY\239815-DET-001-A.DWG

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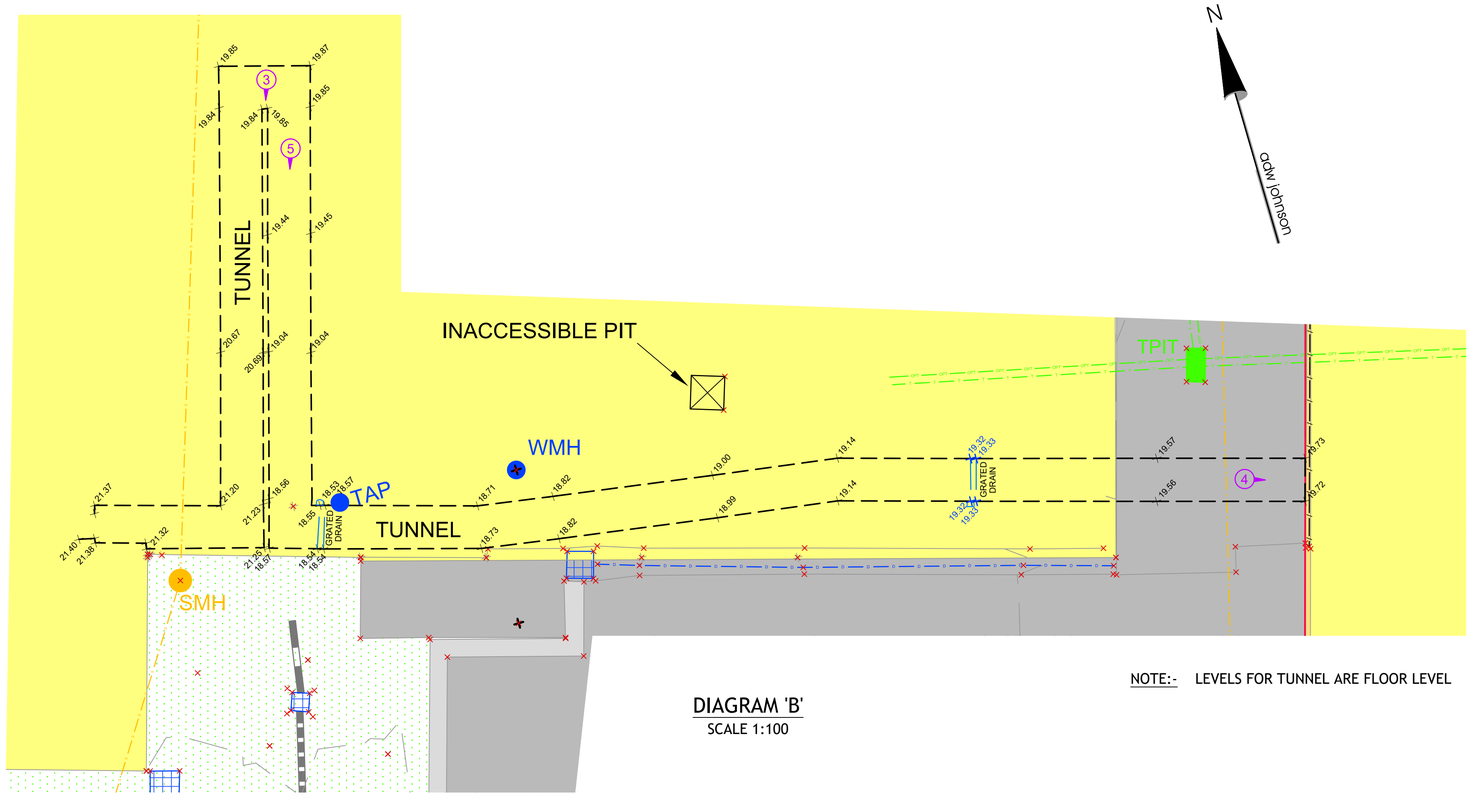
239815-DET-001-A




NOTE:- LEVELS FOR TUNNEL ARE FLOOR LEVEL

DIAGRAM 'B'
SCALE 1:100

PHOTO 1

PHOTO 2

PHOTO 3

PHOTO 4

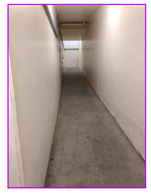


PHOTO 5

PHOTO 6

PHOTO 7

PHOTO 8

PHOTO 9

PHOTO 10

PHOTO 11

PHOTO 12

PHOTO 13

PHOTO 14

PHOTO 15

PHOTO 16

PHOTO 17

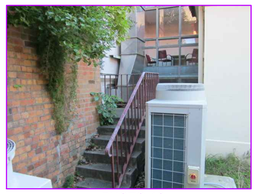


PHOTO 18

PHOTO 19

PHOTO 20

PHOTO 21

| ver. | date | comment | surveyed | drawn | checked | pm | co-ordinate information | level information | scale (A1 original size) | page |
|---|---|---|---|---|---|---|---|---|---|---|
| A | 10.09.18 | INITIAL ISSUE | CD | LB/MC | CD | TC | CO-ORDINATE SYSTEM: MGA 56<br>ORIGIN OF CO-ORDINATES: P.M. 19805<br>DATE OF SURVEY 30.08.18 | DATUM: AHD<br>ORIGIN OF LEVELS: P.M. 190805<br>CONTOUR INTERVAL: 0.5 | 0 2.5 5.0m<br>SCALE: 1:100 (FULL) | 2 OF 2 |

• project management • civil engineering • infrastructure • superintendency • economic analysis • social impact • town planning • surveying • development feasibility • visualisation • urban design

DIAL 1100 BEFORE YOU DIG

working beyond expectations

drawing title:

Detail Survey of
Lot 1 D.P. 1199904

location: 9 Church Street, Newcastle

council: Newcastle

dwg ref: 239815-DET-001-A

client: AZUSA SEKKEI CO LTD


adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411
www.adwjohnson.com.au


Plotted By: Anthony Morgan Plot Date: 10/09/18 3:25:02PM Cad File: N:\239815\DWGS\SURVEY\239815-DET-001-A.DWG

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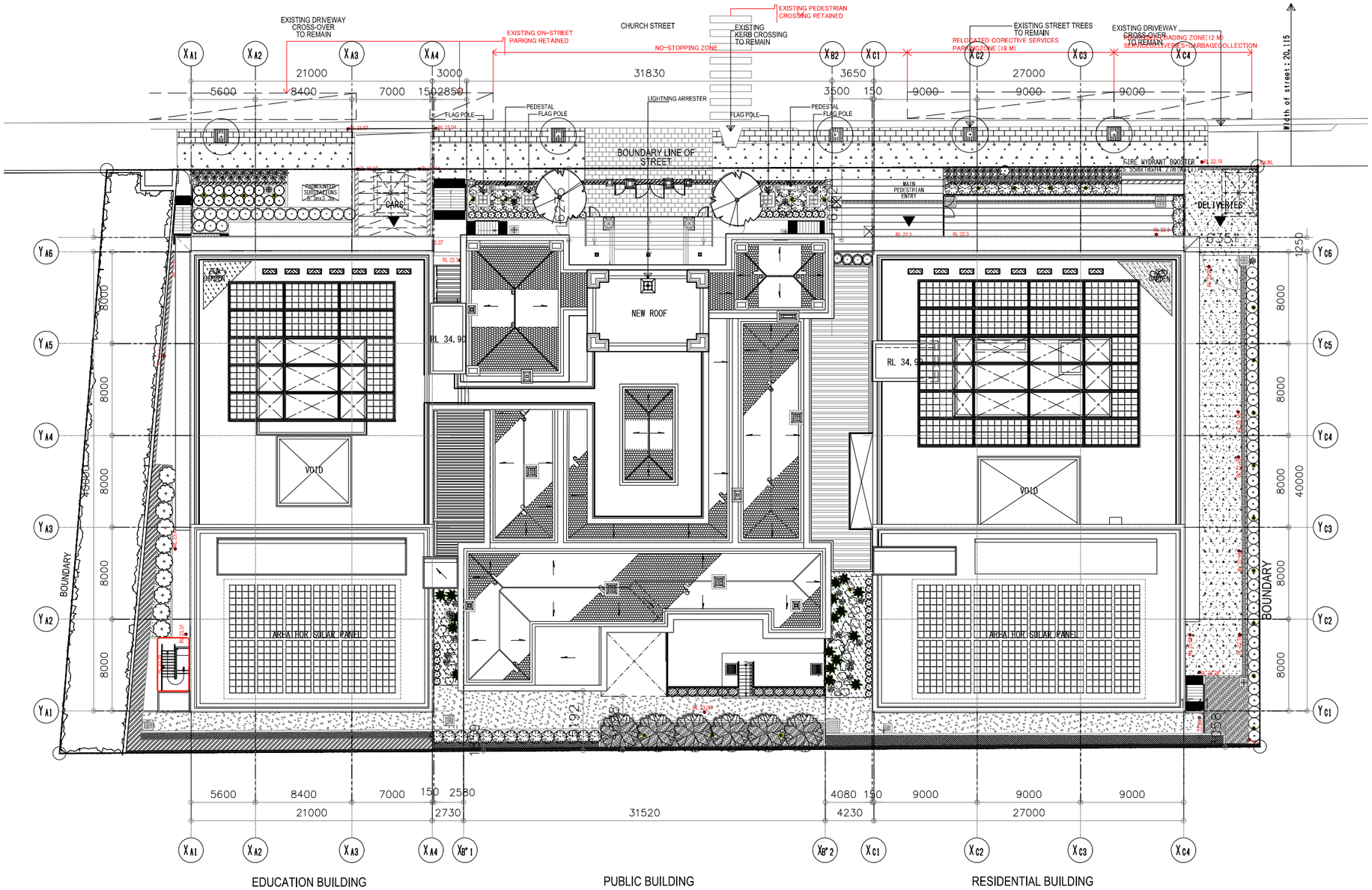



GENERAL LEGEND:

| COLOR LEGEND | | | |
|---|---|---|---|
| | RESIDENTIAL | | CORRIDOR |
| | EDUCATIONAL | | PARKING SPACE |
| | PUBLIC SPACE | | TERRACE |

| ABBREVIATION | | | |
|---|---|---|---|
| FD | FLOOR DRAIN | SW | SHOWER |
| FFL | FINISHED FLOOR LINE | WC | WATER CLOSET |
| FH | FIRE HOSE | UR | URINAL |
| FP | FIRE PLACE | | |
| LAV | LAVATORY | | |
| MH | MAN HOLE | | |
| PC | PIPE CHASE | | |
| R | RANGE | | |
| SK | SINK | | |
| STR | STORAGE | | |

| SYMBOL | |
|---|---|
| FF-00 | FLOOR FINISH |
| RF-00 | ROOF FINISH |
| CF-00 | CEILING FINISH |
| WF-00 | WALL FINISH |
| | LANDSCAPE AREA |
| | ELECTRICAL BOX |
| | FINISHED FLOOR LEVEL |
| | SECTION |
| 00 | DEPRESSED FLOOR |

NOTE:

DRAWING STATUS:

DATE:

ORIENTATION

AZUSA SEKKEI Architects, Engineers & Consultants

dwp

moir landscape architecture

Cardno Shaping the Future

märline BUILDING SERVICES ENGINEERS MECHANICAL, ELECTRICAL, HYDRAULIC, FIRE, ENERGY

Planner

Nihon University
Australia Newcastle Campus Project

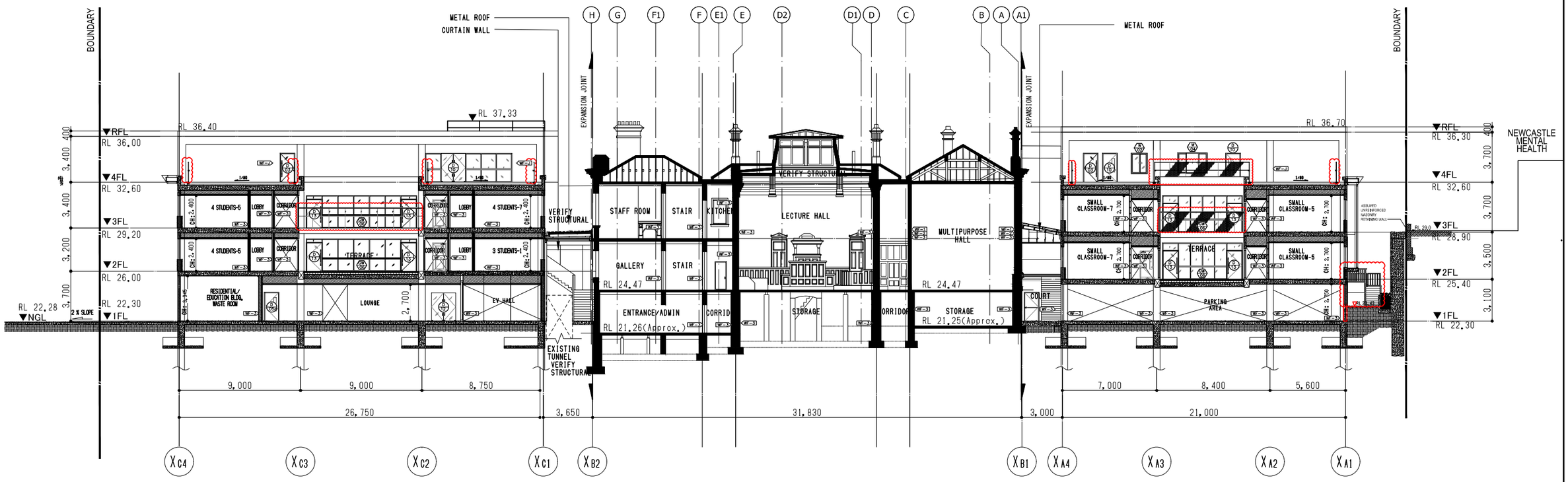
General Arrangement Site Development Plan

Scale 1/A1:200 A3:400

Date 2019・10・19

Drawing No. A — 017

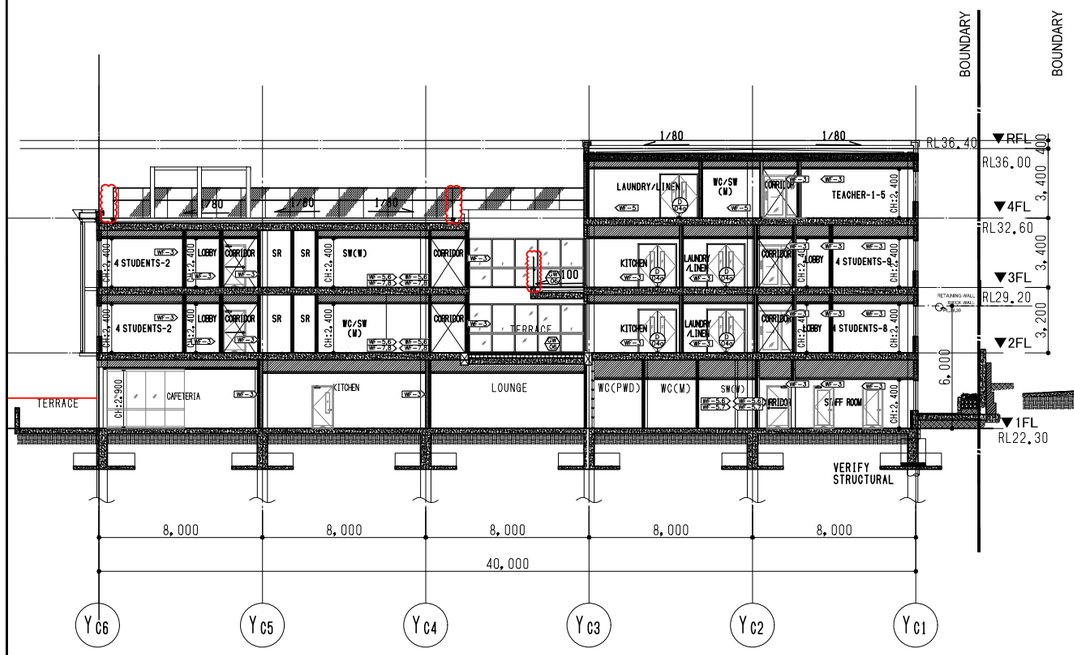
No Rev-10 TENDER AMENDMENTS INCORPORATED



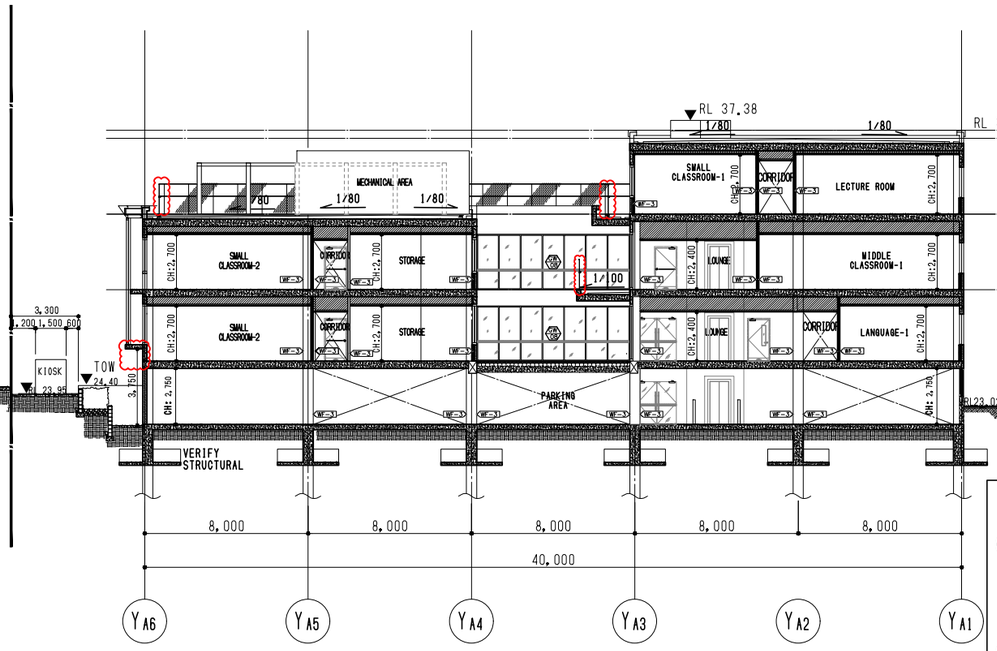

RESIDENTIAL BUILDING

PUBLIC BUILDING
A-A' SECTION

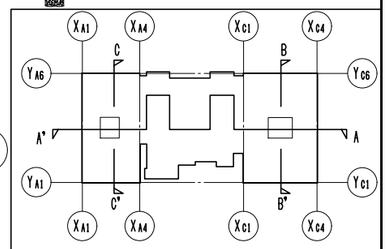
EDUCATION BUILDING




RESIDENTIAL BUILDING
B-B' SECTION




EDUCATION BUILDING
C-C' SECTION




Key Plan

AZUSA SEKKEI Architects, Engineers & Consultants | dwp | moir landscape architecture | Cardno Shaping the Future | marline BUILDING SERVICES ENGINEERS MECHANICAL, ELECTRICAL, HYDRAULIC, FIRE, ENERGY

Planner

Nihon University
Australia Newcastle Campus Project

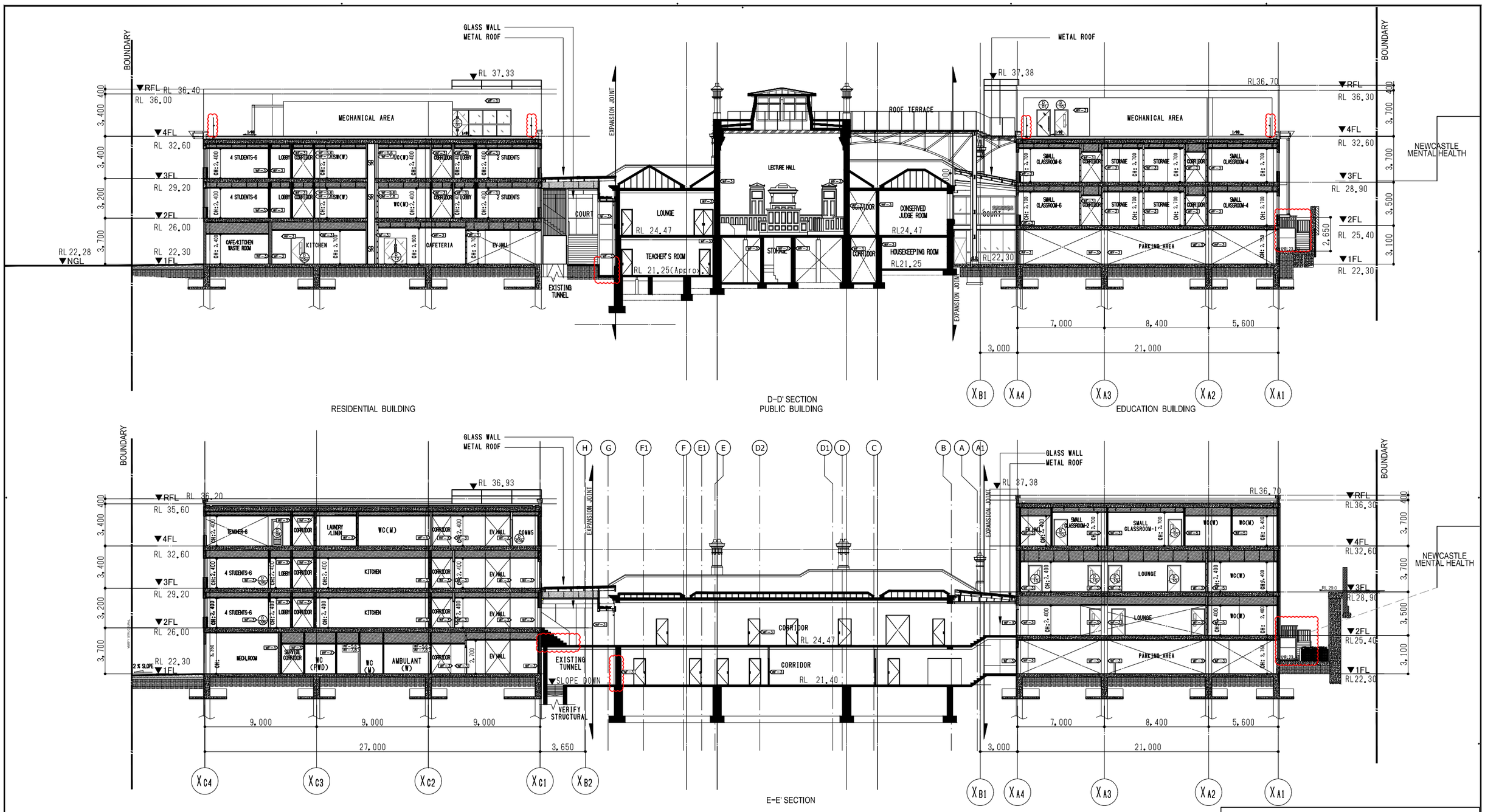
Sections-1
(A'-A',B'-B',C'-C')

Scale 1/ A1-75 A3-150

Date 2019・10・19

Drawing No. A — 209

No. Rev-10 TENDER AMENDMENTS INCORPORATED




AZUSA SEKKEI Architects, Engineers & Consultants

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marline BUILDING SERVICES ENGINEERS MECHANICAL, ELECTRICAL, HYDRAULIC, FIRE, ENERGY

Planner

Nihon University
Australia Newcastle Campus Project

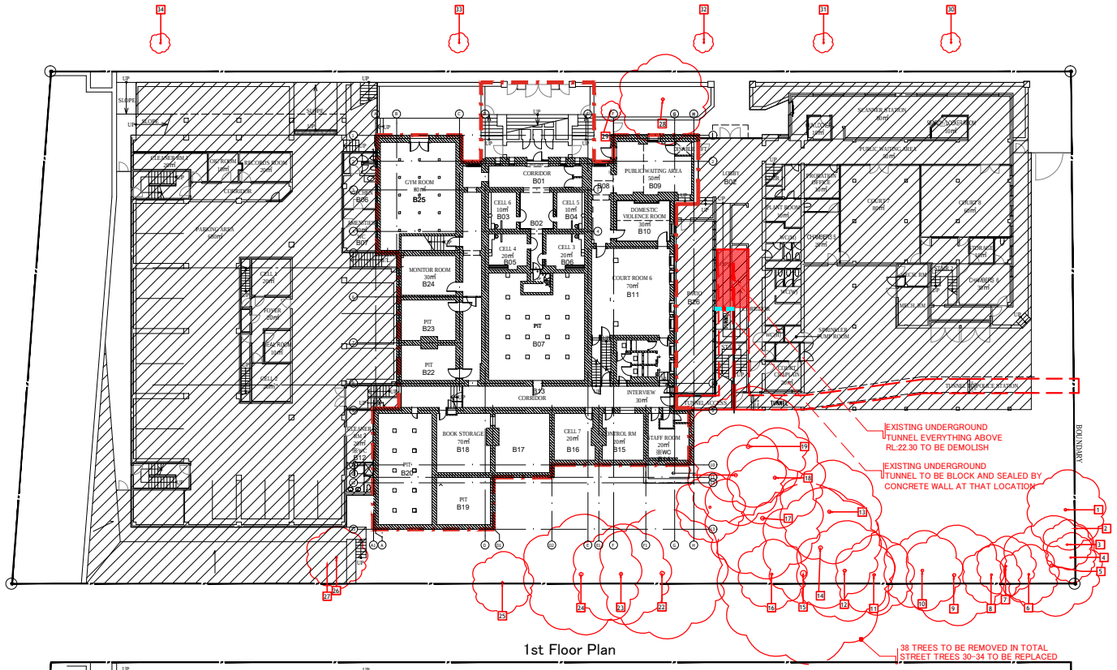
Sections-2
(D'-D',E'-E')

Scale 1/ A1-75 A3-150

Date 2019・10・19

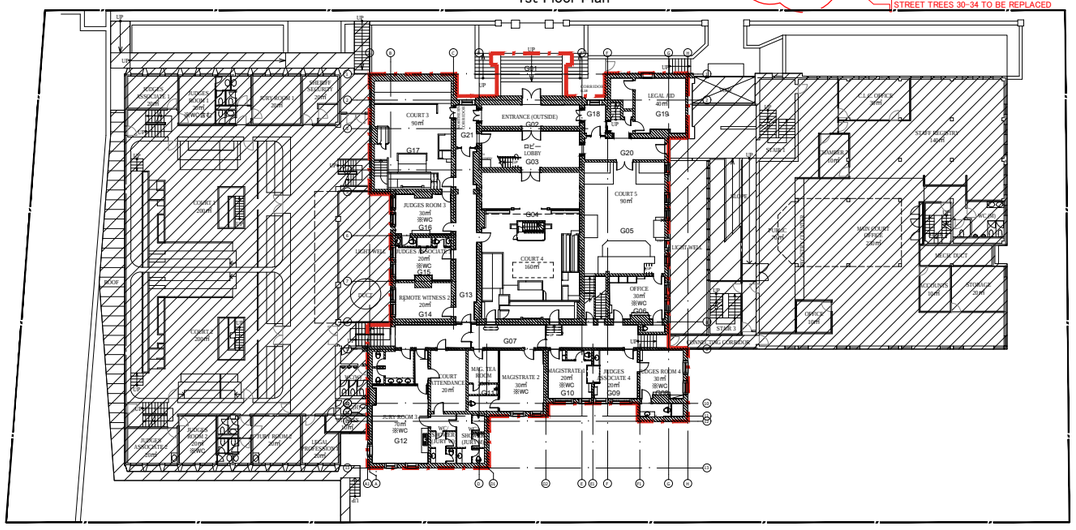
Drawing No. A — 210

No Rev-10
TENDER AMENDMENTS INCORPORATED




1st Floor Plan

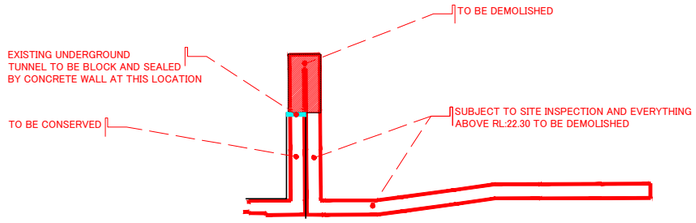
EXISTING 1ST FLOOR PLAN



2nd Floor Plan

EXISTING 2ND FLOOR PLAN

## EXISTING TUNNEL NOTE:




| DEMILITION LEGEND: | |
|---|---|
| | REFER TO CONVERSION PLAN |
| | AREA TO BE DEMOLISHED |
| | TREES TO BE REMOVED |

| AREA TABULATION: | |
|---|---|
| DEMOLITION AREA | |
| 1ST FLR | 1568 sq.m |
| 2ND FLR | 1591 sq.m |
| 3RD FLR | 1133 sq.m |

NOTE :

DRAWING STATUS:

ORIENTATION

| CONVERSION LEGEND | |
|---|---|
| | AREA TO BE CONVERTED |
| | AREA TO BE DEMOLISHED |
| | WALL OPENING AREA |
| | ADDITIONAL WALL |
| | INFILL MASONRY |
| D | LIST OF CONVERSION |
| A | LIST OF DEMOLITION |

AZUSA SEKKEI Architects,Engineers & Consultants

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Cardno Shaping the Future

Planner

Nihon University
Australia Newcastle Campus Project

Demolition Plan-1

Scale 1/A1:1/300 A3:1/600

Date 2019・08・14

Drawing No. A — 018

No Rev-07

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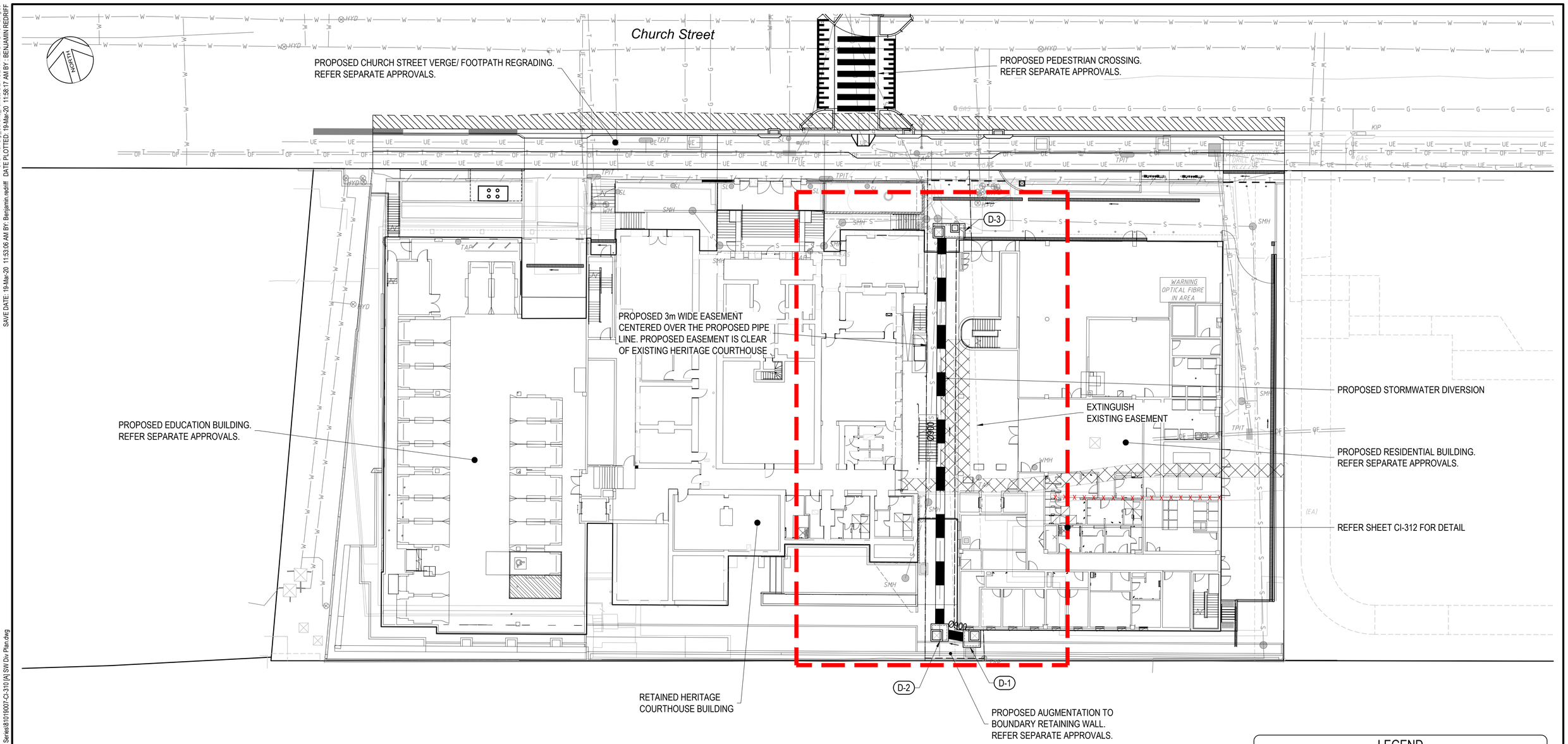


## PLAN

SCALE 1:200

## LEGEND

| | |
|---|---|
| W | EXISTING WATER |
| OF | EXISTING OPTIC FIBRE |
| E | EXISTING ELECTRICITY |
| UE | EXISTING ELECTRICITY UNDERGROUND |
| G | EXISTING GAS |
| T | EXISTING COMMUNICATIONS |
| S | EXISTING SEWER |
| | EXISTING EASEMENT |
| 27 | EXISTING SURFACE CONTOURS (INTERVAL = 0.5m) |
| | EXISTING PIPE |

| Rev. | Date | Description | Des. | Verif. | Appd. |
|---|---|---|---|---|---|
| A | 19/03/2020 | FOR CONSTRUCTION | TH | SGB | SGB |

0 5 10 15 20m
SCALE 1:200 @A1

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34/205-207 Albany Street North
Gosford, NSW 2250
Tel: 02 4323 2558 Fax: 02 4324 3251
Web: www.cardno.com.au

| | | Date |
|---|---|---|
| Drawn | LDB | FEB 2020 |
| Checked | SGB | FEB 2020 |
| Designed | JK | FEB 2020 |
| Verified | SGB | FEB 2020 |
| Approved | SGB | FEB 2020 |

Client: AZUSA SEKKEI

Project: NIHON UNIVERSITY
AUSTRALIA NEWCASTLE CAMPUS PROJECT
9 CHURCH STREET, NEWCASTLE

Title: STORMWATER DIVERSION
SITE PLAN

Status: FOR CONSTRUCTION

| Datum | Register | Scale | Size |
|---|---|---|---|
| AHD | - | | A1 |

Drawing Number: 81019007-CI-310
Revision: A

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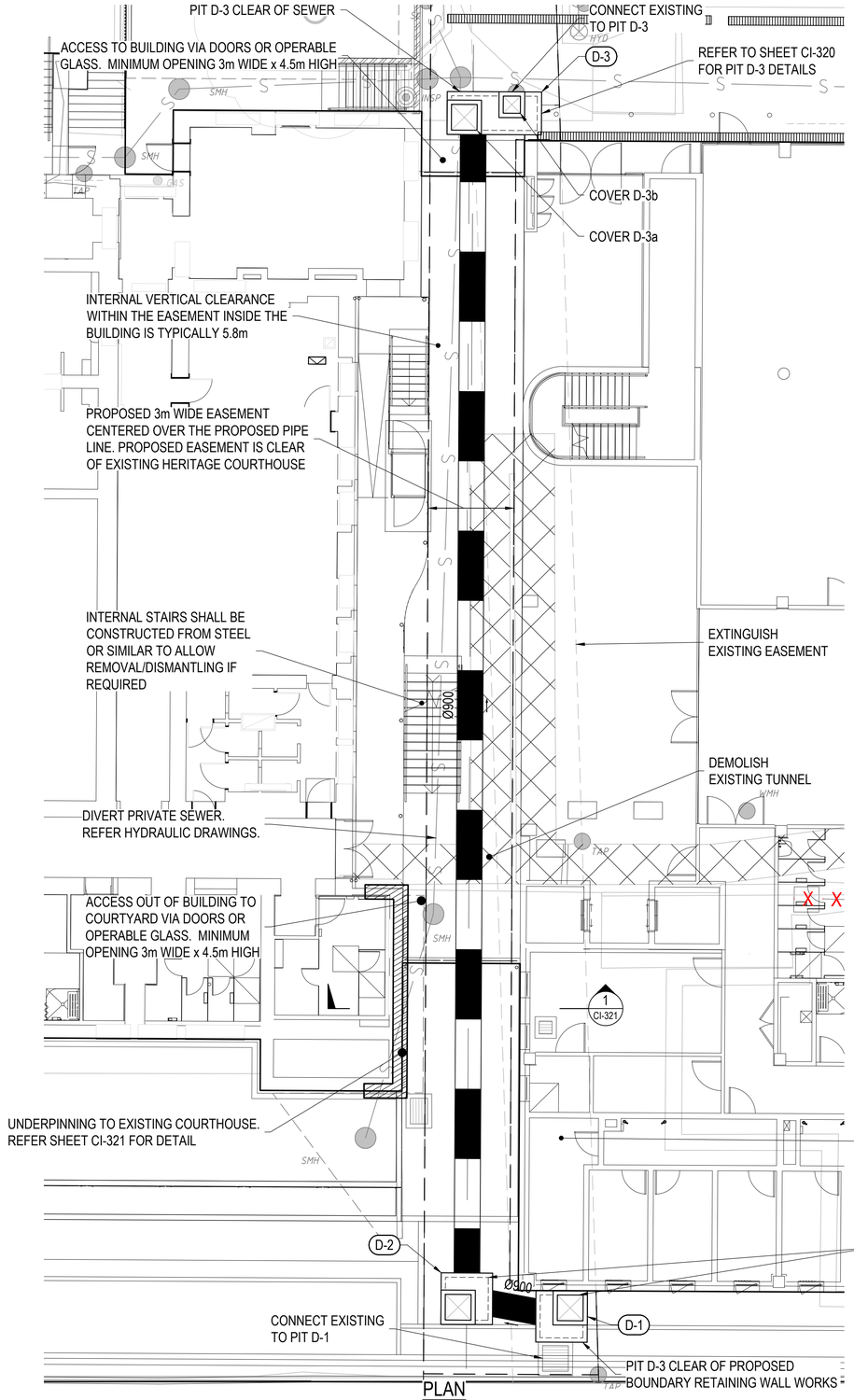


PLAN
SCALE 1:100

## NOTE:

1. PROPOSED BUILDING AND ASSOCIATED WORKS SUBJECT TO SEPARATE APPROVALS.
2. REFER ARCHITECT DRAWINGS FOR BUILDING DETAILS.
3. WORKS MUST BE INSPECTED BY COUNCIL DURING CONSTRUCTION. REFER 'COUNCIL CONSTRUCTION SUPERVISION' NOTES ON DWG 305.

| Rev. | Date | Description | Des. | Verif. | Appd. |
|---|---|---|---|---|---|
| A | 19/03/2020 | FOR CONSTRUCTION | TH | SGB | SGB |

0 1 2 4 6 8 10m
SCALE 1:100 @A1

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Gosford, NSW 2250
Tel: 02 4323 2558 Fax: 02 4324 3251
Web: www.cardno.com.au

| | | Date |
|---|---|---|
| Drawn | LDB | FEB 2020 |
| Checked | SGB | FEB 2020 |
| Designed | JK | FEB 2020 |
| Verified | SGB | FEB 2020 |
| Approved | SGB | FEB 2020 |

Client: AZUSA SEKKEI

Project: NIHON UNIVERSITY
AUSTRALIA NEWCASTLE CAMPUS PROJECT
9 CHURCH STREET, NEWCASTLE

Title: STORMWATER DIVERSION
LAYOUT PLAN

Status: FOR CONSTRUCTION

| Datum | Register | Scale | Size |
|---|---|---|---|
| AHD | - | | A1 |

Drawing Number: 81019007-CI-312
Revision: A

XREF's: x81019007 Survey; x81019007 Civil; x81019007 A1Title; x81019007 Arch; x81019007 Struc Plan
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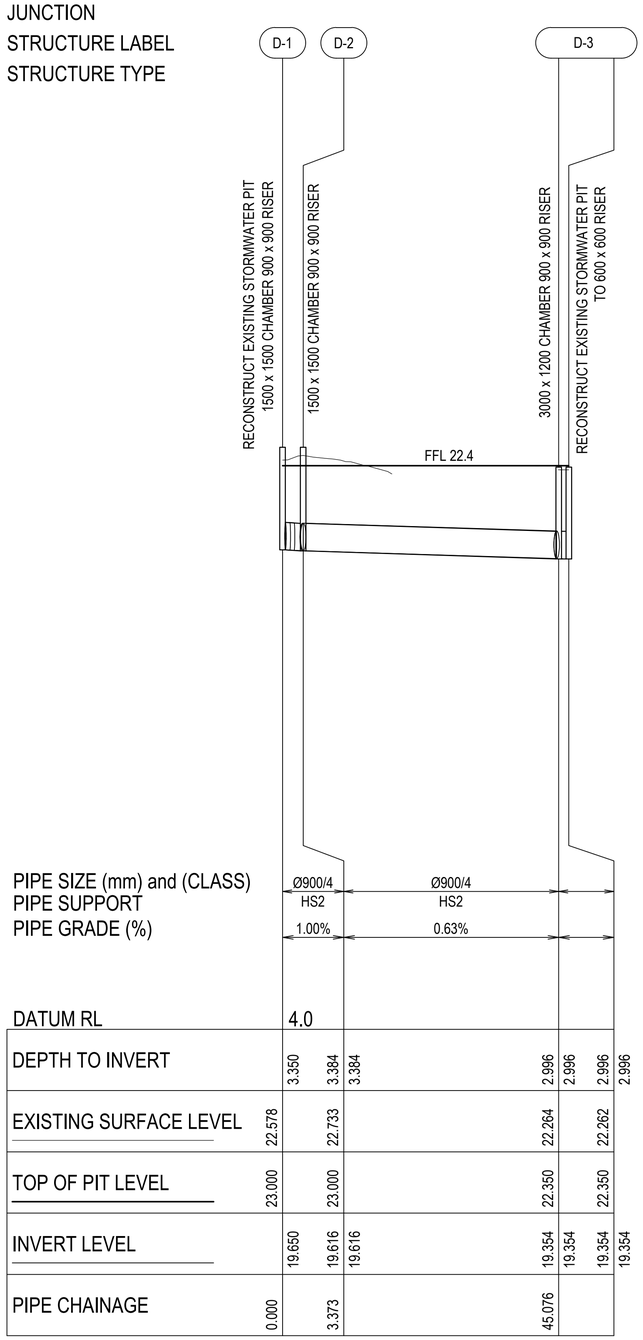
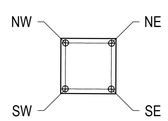



STORMWATER LONGITUDINAL SECTION

SCALE: H 1:500
V 1:100

| CHAMBERS SET OUT | | |
|---|---|---|
| D-1 CHAMBER | EASTING | NORTHING |
| NE | 386163.772 | 6355761.279 |
| NW | 386162.333 | 6355761.704 |
| SE | 386163.347 | 6355759.840 |
| SW | 386161.908 | 6355760.265 |
| D-2 CHAMBER | EASTING | NORTHING |
| NE | 386160.758 | 6355762.794 |
| NW | 386159.320 | 6355763.219 |
| SE | 386160.333 | 6355761.355 |
| SW | 386158.895 | 6355761.780 |
| D-3 CHAMBER | EASTING | NORTHING |
| NE | 386173.889 | 6355801.997 |
| NW | 386171.012 | 6355802.847 |
| SE | 386173.549 | 6355800.846 |
| SW | 386170.672 | 6355801.696 |

| PIT COVER DETAILS | |
|---|---|
| PIT | COVER |
| D-1 | REFER TO THE CITY OF NEWCASTLE STANDARD DRAWING A2102 FOR PIT DETAILS |
| D-2 | REFER TO THE CITY OF NEWCASTLE STANDARD DRAWING A2102 FOR PIT DETAILS |
| D-3a | 900SQ MASCOT ENGINEERING CLASS D PAVER INFILL COVER AND FRAME (CODE: MFPI99D) OR APPROVED EQUAL. COVER INFILL TO MATCH ADJOINING PAVEMENT |
| D-3b | 600SQ MASCOT ENGINEERING CLASS D PAVER INFILL COVER AND FRAME (CODE: MFPI66D) OR APPROVED EQUAL. COVER INFILL TO MATCH ADJOINING PAVEMENT |




PIT SETOUT DIAGRAM

SCALE 1:50

NOTE:

PIPE CHAINAGES APPROXIMATE ONLY DUE TO OVERSIZE PIT CHAMBERS

| Rev. | Date | Description | Des. | Verif. | Appd. |
|---|---|---|---|---|---|
| A | 19/03/2020 | FOR CONSTRUCTION | TH | SGB | SGB |

H: 0 10 20 30 40 50m
V: 0 2 4 6 8 10m
SCALE: H:1:500 V:1:100 @A1

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| | | Date |
|---|---|---|
| Drawn | LDB | FEB 2020 |
| Checked | SGB | FEB 2020 |
| Designed | JK | FEB 2020 |
| Verified | SGB | FEB 2020 |
| Approved | SGB | FEB 2020 |

Client: AZUSA SEKKEI

Project: NIHON UNIVERSITY
AUSTRALIA NEWCASTLE CAMPUS PROJECT
9 CHURCH STREET, NEWCASTLE

Title: STORMWATER DIVERSION
STORMWATER LONGITUDINAL SECTION

Status: FOR CONSTRUCTION

Datum: AHD | Register: - | Scale: | Size: A1

Drawing Number: 81019007-CI-315

Revision: A

XREF's: x81019007 A1Title
CAD File: \\cardno.corp\global\AU\NSW\directorystructure\Projects\805\FY19\81019007_newcastle courthouse\Drawings\Build\Civil\300 Series\81019007-CI-315 [A] SW Div LS.dwg

**LOCALITY PLAN**

Scale: NTS

# NIHON UNIVERSITY
# TENDER DOCUMENTATION

| Sheet No. | Sheet Name | Revision | Date |
|---|---|---|---|
| LP00 | COVER SHEET | G | 6/4/20 |
| LP01 | DEMOLITION PLAN | F | 6/4/20 |
| LP02 | GENERAL ARRANGEMENT PLAN | G | 6/4/20 |
| LP03 | DETAIL PLANTING PLAN -1 | G | 6/4/20 |
| LP04 | DETAIL PLANTING PLAN -2 | G | 6/4/20 |
| LP05 | DETAIL PLANTING PLAN -3 | G | 6/4/20 |
| LP06 | DETAIL PLANTING PLAN -4 | G | 6/4/20 |
| LP07 | ARRANGEMENT PLAN - 4F | F | 6/4/20 |
| LP08 | SETOUT PLAN - 1 | - | 2/8/19 |
| LP09 | SETOUT PLAN - 2 | - | 2/8/19 |
| LP10 | NORTH ELEVATION | G | 6/4/20 |
| LP11 | SECTIONS - 1 | G | 6/4/20 |
| LP12 | SECTIONS - 2 | G | 6/4/20 |
| LP13 | PLANTING DETAILS | G | 6/4/20 |
| LP14 | DETAILS | G | 6/4/20 |
| LP15 | SPECIFICATIONS | F | 6/4/20 |
| LP16 | SPECIFICATIONS | F | 6/4/20 |

APPENDIX - FIXTURES MANUFACTURE SPECIFICATION

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6. DRAWINGS TO BE PRINTED IN COLOUR ONLY

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dwp
Engineer: Cardno Shaping the Future

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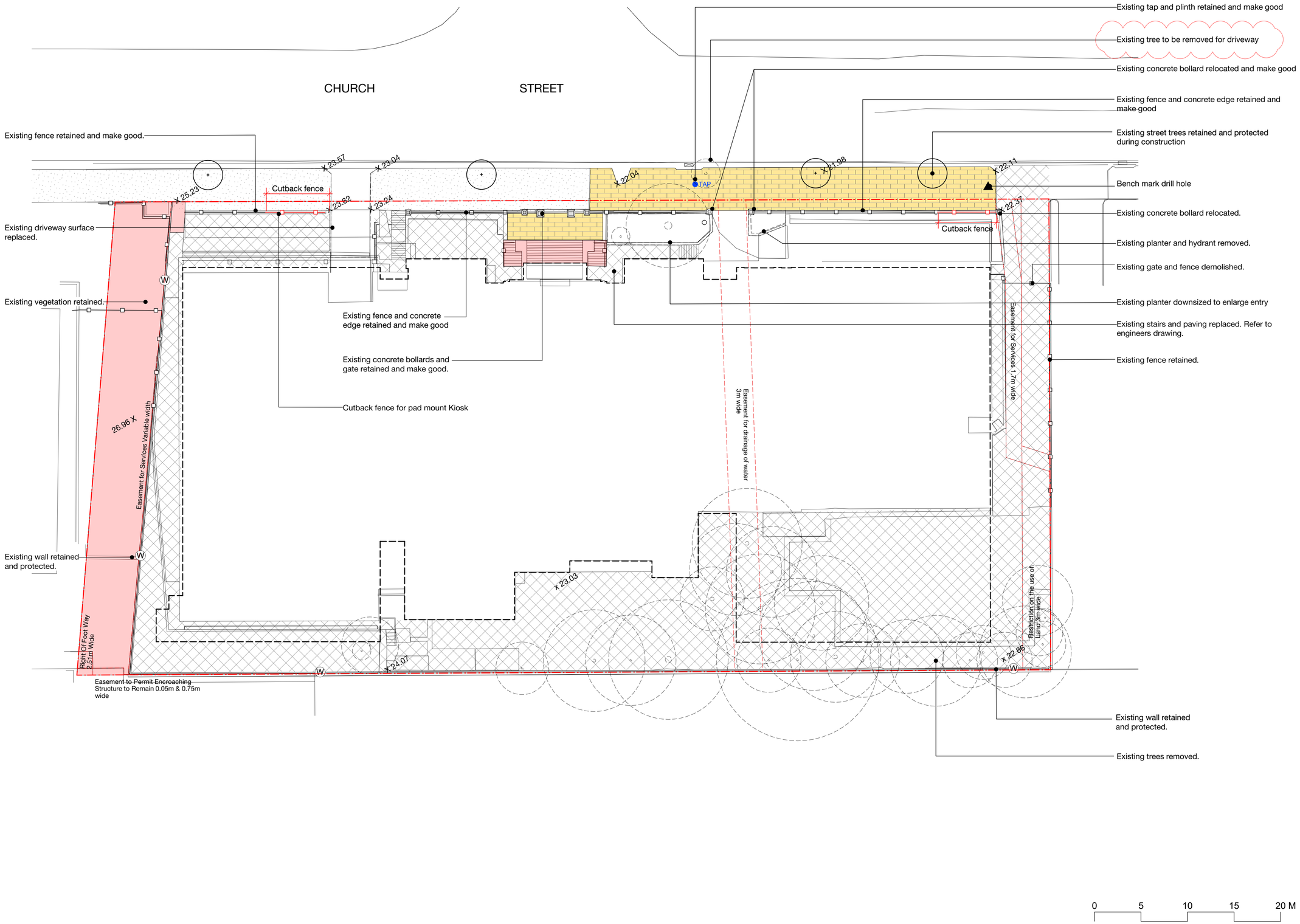
**COVER SHEET**

SCALE: NTS
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW

Project No. 1691
Drawing No. Rev LP00 G




## LEGEND

- Site boundary
- Easement line
- x 57.120 — Existing Spot level
- Existing tree - to be retained & protected
- Existing tree - to be removed
- Existing asphalt to be removed
- Existing brick paving removed and stored for re-use in new paving
- Existing vegetation & elements retained and protected
- Area of demolition works
- Existing raised concrete edge to be retained
- Existing raised concrete edge to be retained
- Existing fence retained and protected
- Existing fence relocated and repainted
- W — Existing wall retained and protected
- Existing stormwater pit
- Existing concrete bollard to be removed and stored for re-use on site
- Tap — Existing tap and plinth retained and protected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# DEMOLITION PLAN

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ORIGINAL DRAWING AT A1.

Drawn By: CX
Checked By: MW

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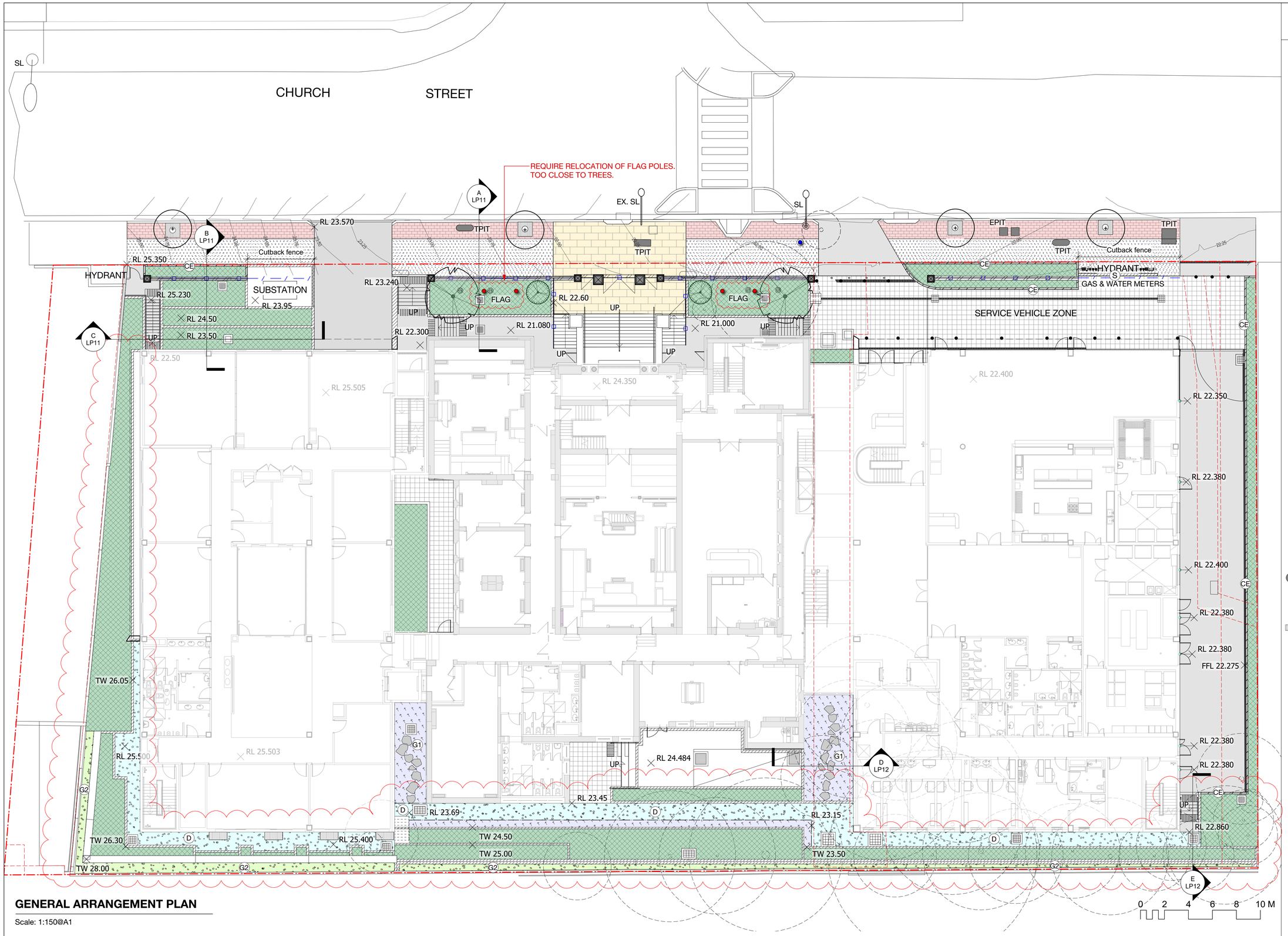
Drawing No. LP01 Rev F




## GENERAL ARRANGEMENT PLAN

Scale: 1:150@A1

## LEGEND

- Lot boundary
- Easement line
- 22.25 — Proposed level refer to Engineer's detail
- Existing heritage fence & concrete edge to be retained
- Existing heritage fence & concrete edge to be cut
- Heritage brick paving refer to 6/LP14
- Sandstone paving refer to 4/LP14
- Concrete paving refer to Engineer's detail. Colour: Natural.
- Asphalt paving refer to Engineer's detail
- Pavement refer to Architect's detail
- D — Decomposed granite - refer to 3/LP14
- G1 — White crushed gravel -refer to specification
- G2 — Blue metal -refer to specification
- Random stepping stones -refer to 1/LP14
- CE — Concrete edge refer to Engineer's detail
- S — Signage wall by Architect
- Existing plinth to be retained
- Proposed removable bollards
- FLAG — Proposed flag pole
- SL — New street light refer to Engineer's detail
- EX. SL — Existing street light to be retained
- Existing sandstone pillar to be retained & relocated
- EPIT — Existing electrical pit
- TPIT — Existing Telstra pit
- Tactile ground surface indicator Colour: Black
- Drainage refer to Engineers detail.
- Stormwater pit refer to Engineers detail.
- Existing trees to be removed
- Existing trees to be retained
- Landscape planting - refer to Detail Planting Plan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Engineer: Cardno Shaping the Future

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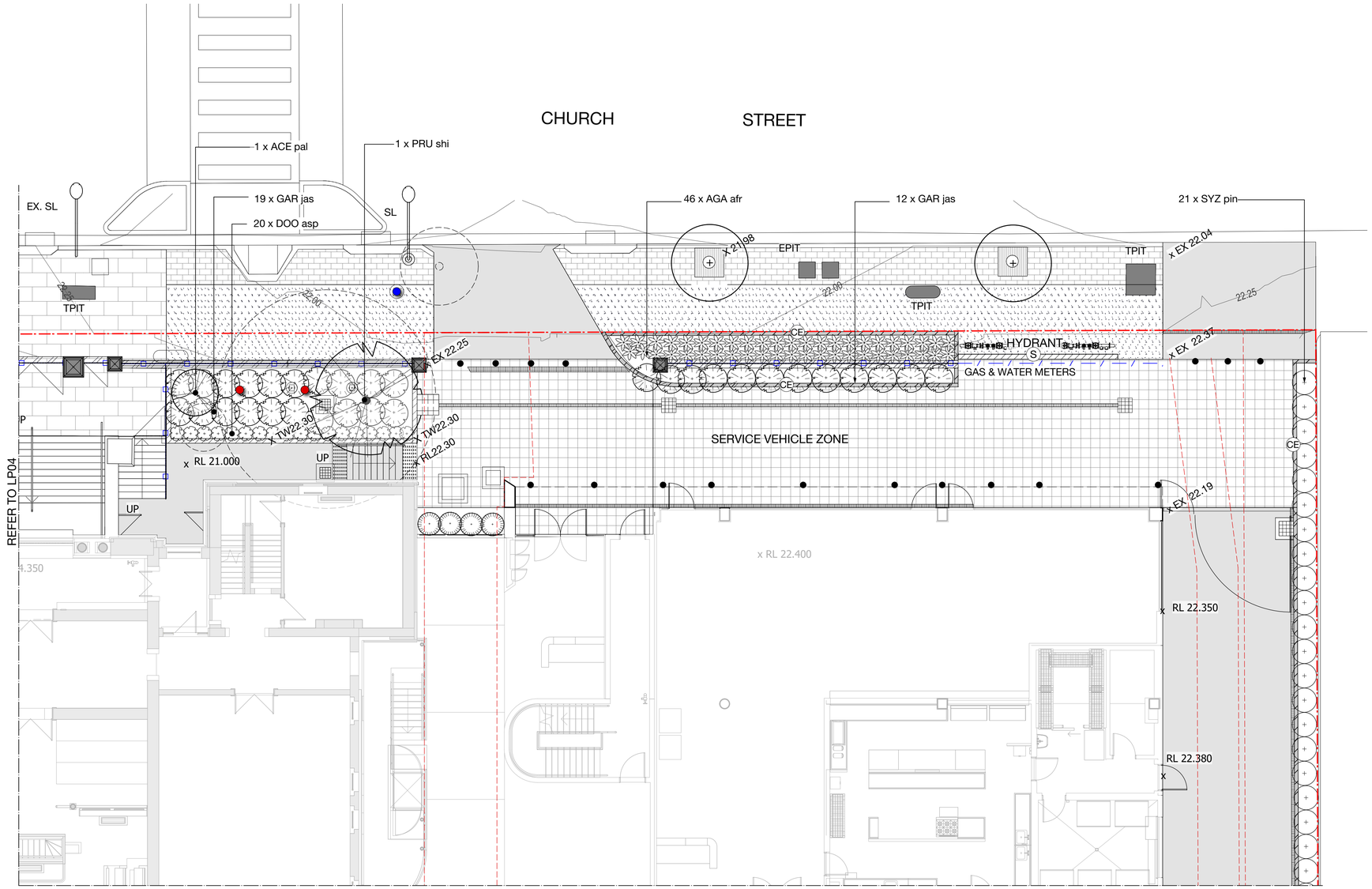
**GENERAL ARRANGEMENT PLAN**

SCALE: 1:150@A1
ORIGINAL DRAWING AT A1.

Drawn By: CX
Checked By: MW

Project No. 1691
Drawing No. LP02 Rev G




## DETAIL PLANTING PLAN -1

scale: 1:100@A1

0 2 4 6 8 M

## PLANT SCHEDULE

| Code | Botanical Name | Common Name | Pot Size | Mature Height | Mature Spread | Qty |
|---|---|---|---|---|---|---|
| **Trees** | | | | | | |
| ACE nes | *Acer palmatum* | Japanese Maple | 100 litre | 4 - 5m | 2.5 - 4m | 6 |
| ACE pal | *Acer palmatum 'Atropurpureum'* | Weeping Japanese Maple | 100 litre | 1.5m | 2m | 2 |
| PRU shi | *Prunus 'Shimidus Sakura'* | Japanese Flowering Cherry | 100 litre | 4 - 5m | 4 - 5m | 2 |
| **Shrubs/groundcovers** | | | | | | |
| ACM smi | *Acmena smithii 'Forest Flame'* | Acmena Forest Flame | 200mm | 1-2m | 1m | 16 |
| AGA afr | *Agapanthus africanus* | African Lily | 200mm | 0.5-1m | 0.5-1m | 75 |
| ANT and | *Anthurium andreanum 'White Winner'* | Anthurium White Winner | 300mm | 0.6-0.8m | 0.6m | 11 |
| DOO asp | *Doodia aspera* | Prickly Rasp Fern | 200mm | 0.4 - 0.5m | 0.4 - 0.6m | 36 |
| GAR jas | *Gardenia jasminoides* | Cape Jasmine | 200mm | 1-2m | 1.5-3m | 74 |
| HYM lit | *Hymenocallis littoralis* | Spider Lily | 200mm | 0.3-0.6m | 0.3-2m | 4 |
| MON del | *Monstera deliciosa* | Swiss Cheese Plant | 200mm | 0.9m | 0.75m | 7 |
| PIT tob | *Pittosporum tobira 'Miss Muffet'* | Dwarf Pittosporum | 200mm | 1m | 1.5m | 60 |
| RHO hyb | *Rhododendron hybrid 'Conlee'* | Azalea Autumn Amethyst | 200mm | 1.0m | 1.0m | 25 |
| SYZ pin | *Syzygium pinnacle* | Pinnacle Lilly Pilly | 300mm | 6m | 1-1.5m | 47 |
| WES fru | *Westringia fruticosa* | Coastal Rosemary | 200mm | 1-2m | 2-4m | 8 |
| **Mass planting & Hedging** | | | | | | |
| BAM tex | *Bambusa textilis var. Gracilis* | Slender Weaver's Bamboo | 140mm | 6-7m | ø3cm | 165 |
| TRA jas | *Trachelospermum jasminoides* | Star Jasmine | 140mm | 0.2m | 5-8m | 50 |
| CHL com | *Chlorophytum comosum 'Ocean'* | Spider Plant | 140mm | 0.3m | 0.3m | 79 |
| TRA jas | *Liriope muscari* | Liriope muscari Variegata | 200mm | 0.2m | 0.2m | 80 |

(Contractor is required to check all numbers on drawings and confirm with schedule prior to ordering.)

## LEGEND

- Lot boundary
- Easement line
- Existing trees to be removed
- Existing trees to be retained
- SE — Steel edge - refer to detail

### TREES

- ACE pal — *Acer palmatum 'Atropurpureum'* Weeping Japanese Maple
- PRU shi — *Prunus 'Shimidsu Sakura'* Japanese Flowering Cherry
- ACE pal — *Acer palmatum* Japanese Maple

### SHRUBS / GROUNDCOVERS

- GAR jas — *Gardenia jasminoides* Cape Jasmine
- HYM lit — *Hymenocallis littoralis* Spider Lily
- WES fru — *Westringia fruticosa* Coastal Rosemary
- ACM smi — *Acmena smithii 'Forest Flame'* Acmena Forest Flame
- CAM him — *Camellia hiemalis 'Hiryu'* Camellia
- SYZ pin — *Syzygium pinnacle* Pinnacle Lilly Pilly
- PIT tob — *Pittosporum tobira 'Miss Muffet'* Dwarf Pittosporum
- MON del — *Monstera deliciosa* Swiss Cheese Plant
- RHO hyb — *Rhododendron hybrid 'Conlee'* Azalea Autumn Amethyst
- DOO asp — *Doodia aspera* Prickly Rasp Fern
- AGA afr — *Agapanthus africanus* African Lily
- POL mun — Polystichum munitum Western Sword Fern
- BLE gib — Blechnum gibbum Blechnum Silver Lady Fern

### MASS PLANTING / HEDGING (3-4/m²)

- MP1 — *Bambusa textilis var. Gracilis* Slender Weaver's Bamboo
- MP2 — *Trachelospermum jasminoides* Star Jasmine
- MP3 — *Chlorophytum comosum 'Ocean'* Spider Plant
- MP4 — *Liriope muscari* Liriope muscari Variegata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Engineer: Cardno Shaping the Future

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| C | 5/7/19 | 90% DRAFT | CX |
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**DETAIL PLANTING PLAN -1**

SCALE: 1:100@A1
ORIGINAL DRAWING AT A1.

Drawn By: CX
Checked By: MW

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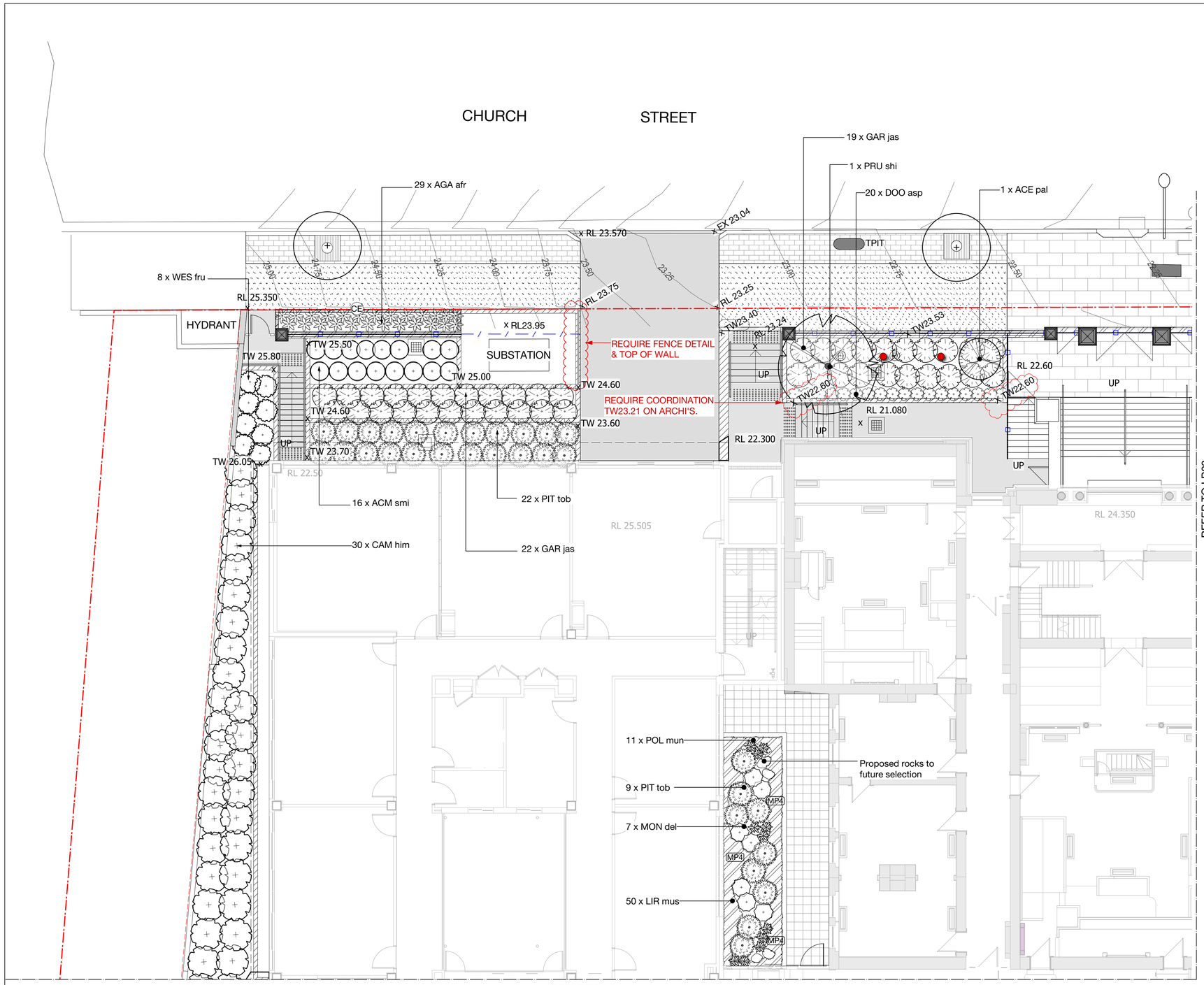
Drawing No. LP03 Rev G




## DETAIL PLANTING PLAN - 2

scale: 1:100@A1

0 2 4 6 8 M

## LEGEND

- Lot boundary
- Easement line
- Existing trees to be removed
- Existing trees to be retained
- SE — Steel edge - refer to detail

### TREES

- ACE pal — *Acer palmatum 'Atropurpureum'* Weeping Japanese Maple
- PRU shi — *Prunus 'Shimidsu Sakura'* Japanese Flowering Cherry
- ACE pal — *Acer palmatum* Japanese Maple

### SHRUBS / GROUNDCOVERS

- GAR jas — *Gardenia jasminoides* Cape Jasmine
- HYM lit — *Hymenocallis littoralis* Spider Lily
- WES fru — *Westringia fruticosa* Coastal Rosemary
- ACM smi — *Acmena smithii 'Forest Flame'* Acmena Forest Flame
- CAM him — *Camellia hiemalis 'Hiryu'* Camellia
- SYZ pin — *Syzygium pinnacle* Pinnacle Lilly Pilly
- PIT tob — *Pittosporum tobira 'Miss Muffet'* Dwarf Pittosporum
- MON del — *Monstera deliciosa* Swiss Cheese Plant
- RHO hyb — *Rhododendron hybrid 'Conlee'* Azalea Autumn Amethyst
- DOO asp — *Doodia aspera* Prickly Rasp Fern
- AGA afr — *Agapanthus africanus* African Lily
- POL mun — Polystichum munitum Western Sword Fern
- BLE gib — Blechnum gibbum Blechnum Silver Lady Fern

### MASS PLANTING / HEDGING (3-4/m²)

- MP1 — *Bambusa textilis var. Gracilis* Slender Weaver's Bamboo
- MP2 — *Trachelospermum jasminoides* Star Jasmine
- MP3 — *Chlorophytum comosum 'Ocean'* Spider Plant
- MP4 — *Liriope muscari* Liriope muscari Variegata

Note:
Planting schedule on drawing LP03

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**DETAIL PLANTING PLAN -2**

SCALE: 1:100@A1
ORIGINAL DRAWING AT A1.
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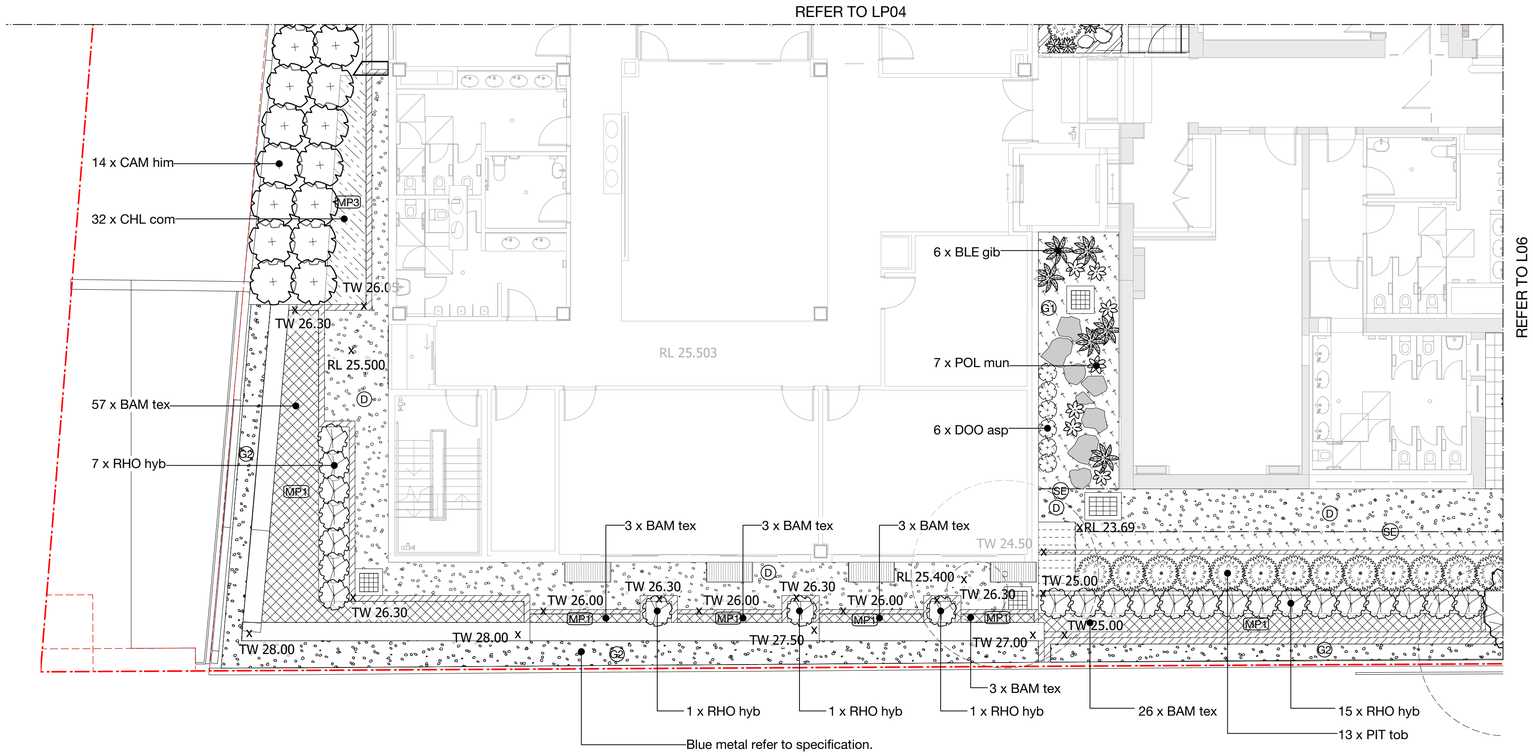
Checked By: MW

Project No. **1691**
Drawing No. Rev
LP04 G




## DETAIL PLANTING PLAN - 3

scale: 1:100@A1

0 2 4 6 8 M

## LEGEND

- Lot boundary
- Easement line
- Existing trees to be removed
- Existing trees to be retained
- Steel edge - refer to detail

### TREES

| | |
|---|---|
| ACE pal | *Acer palmatum 'Atropurpureum'* Weeping Japanese Maple |
| PRU shi | *Prunus 'Shimidsu Sakura'* Japanese Flowering Cherry |
| ACE pal | *Acer palmatum* Japanese Maple |

### SHRUBS / GROUNDCOVERS

| | |
|---|---|
| GAR jas | *Gardenia jasminoides* Cape Jasmine |
| HYM lit | *Hymenocallis littoralis* Spider Lily |
| WES fru | *Westringia fruticosa* Coastal Rosemary |
| ACM smi | *Acmena smithii 'Forest Flame'* Acmena Forest Flame |
| CAM him | *Camellia hiemalis 'Hiryu'* Camellia |
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| MON del | *Monstera deliciosa* Swiss Cheese Plant |
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| DOO asp | *Doodia aspera* Prickly Rasp Fern |
| AGA afr | *Agapanthus africanus* African Lily |
| POL mun | Polystichum munitum Western Sword Fern |
| BLE gib | Blechnum gibbum Blechnum Silver Lady Fern |

### MASS PLANTING / HEDGING (3-4/m²)

| | |
|---|---|
| MP1 | *Bambusa textilis var. Gracilis* Slender Weaver's Bamboo |
| MP2 | *Trachelospermum jasminoides* Star Jasmine |
| MP3 | *Chlorophytum comosum 'Ocean'* Spider Plant |
| MP4 | *Liriope muscari* Liriope muscari Variegata |

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**DETAIL PLANTING PLAN -3**

SCALE: AS SHOWN
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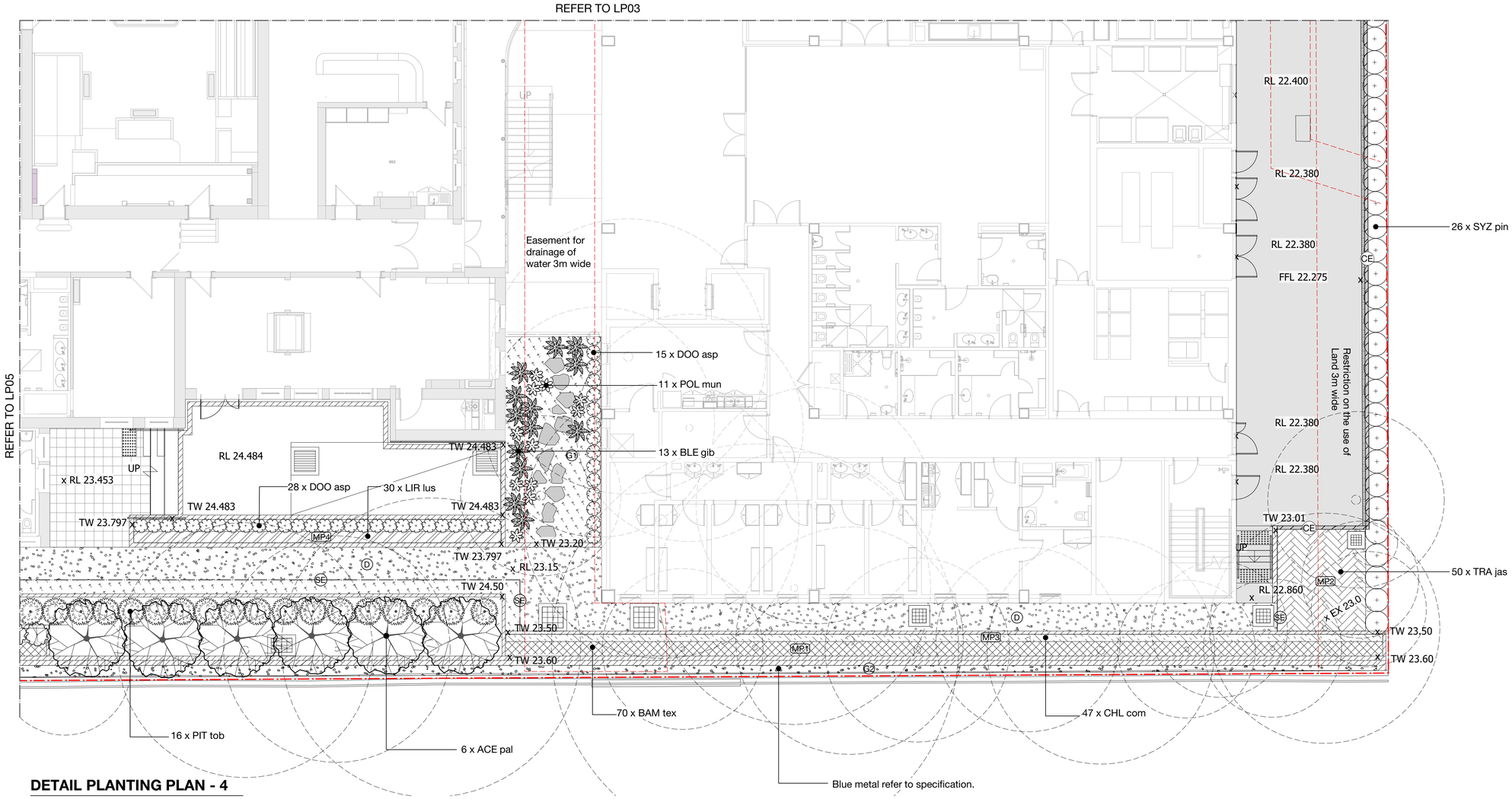
Drawn By: CX
Checked By: MW

Project No. 1691
Drawing No. LP05 G
Rev




## DETAIL PLANTING PLAN - 4

scale: 1:100@A1

0 2 4 6 8 M

## LEGEND

- Lot boundary
- Easement line
- Existing trees to be removed
- Existing trees to be retained
- SE Steel edge - refer to detail

### TREES

| | | |
|---|---|---|
| ACE pal | *Acer palmatum 'Atropurpureum'* | Weeping Japanese Maple |
| PRU shi | *Prunus 'Shimidsu Sakura'* | Japanese Flowering Cherry |
| ACE pal | *Acer palmatum* | Japanese Maple |

### SHRUBS / GROUNDCOVERS

| | | |
|---|---|---|
| GAR jas | *Gardenia jasminoides* | Cape Jasmine |
| HYM lit | *Hymenocallis littoralis* | Spider Lily |
| WES fru | *Westringia fruticosa* | Coastal Rosemary |
| ACM smi | *Acmena smithii 'Forest Flame'* | Acmena Forest Flame |
| CAM him | *Camellia hiemalis 'Hiryu'* | Camellia |
| SYZ pin | *Syzygium pinnacle* | Pinnacle Lilly Pilly |
| PIT tob | *Pittosporum tobira 'Miss Muffet'* | Dwarf Pittosporum |
| MON del | *Monstera deliciosa* | Swiss Cheese Plant |
| RHO hyb | *Rhododendron hybrid 'Conlee'* | Azalea Autumn Amethyst |
| DOO asp | *Doodia aspera* | Prickly Rasp Fern |
| AGA afr | *Agapanthus africanus* | African Lily |
| POL mun | Polystichum munitum | Western Sword Fern |
| BLE gib | Blechnum gibbum | Blechnum Silver Lady Fern |

### MASS PLANTING / HEDGING (3-4/m²)

| | | |
|---|---|---|
| MP1 | *Bambusa textilis var. Gracilis* | Slender Weaver's Bamboo |
| MP2 | *Trachelospermum jasminoides* | Star Jasmine |
| MP3 | *Chlorophytum comosum 'Ocean'* | Spider Plant |
| MP4 | *Liriope muscari* | Liriope muscari Variegata |

Note:
Planting schedule on drawing LP03

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6. DRAWINGS TO BE PRINTED IN COLOUR ONLY

Architect: AZUSA SEKKEI Architects, Engineers & Consultants
dwp
Engineer: Cardno Shaping the Future

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|---|---|---|---|
| A | 6/6/19 | DRAFT | CX |
| B | 26/6/19 | 85% DRAFT | CX |
| C | 5/7/19 | 90% DRAFT | CX |
| D | 11/7/19 | FOR COORDINATION | CX |
| E | 2/8/19 | FOR TENDER | CX |
| F | 16/3/20 | FOR COORDINATION | CX |
| G | 6/4/20 | FOR COORDINATION | CX |

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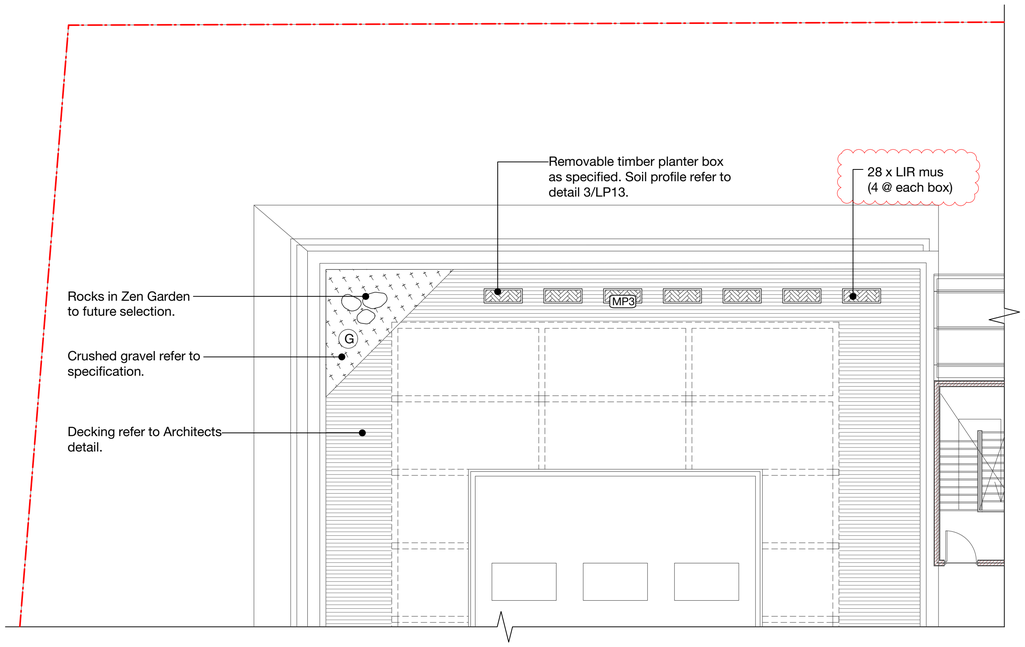
**DETAIL PLANTING PLAN -4**

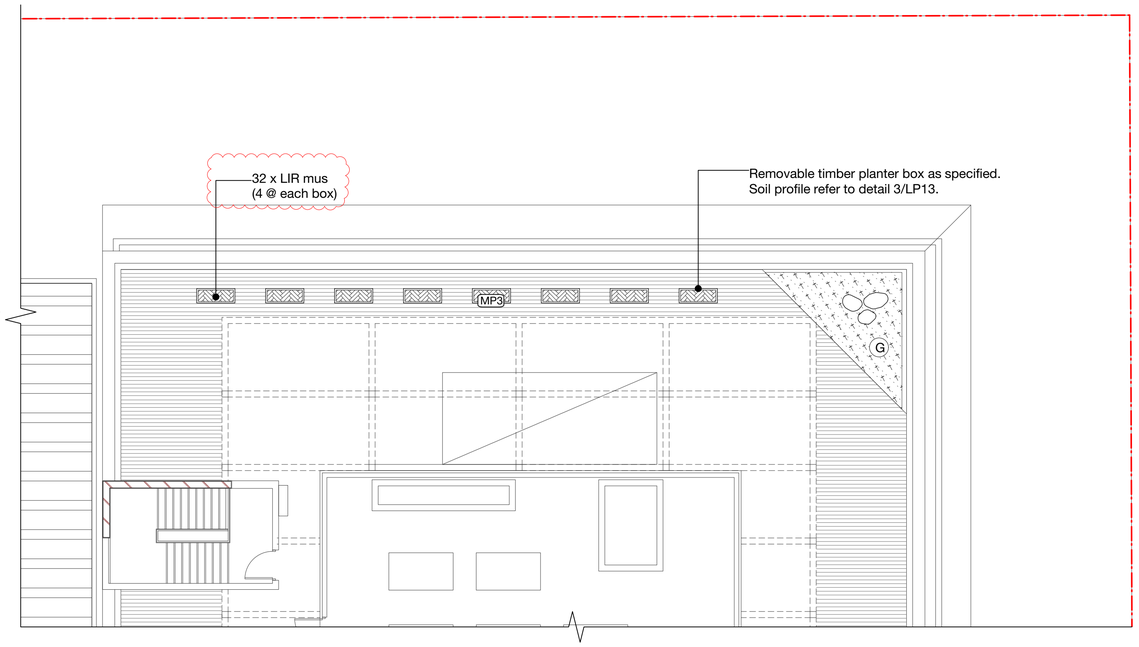
SCALE: 1:100@A1
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW

Project No. **1691**
Drawing No. LP06 Rev G




## DETAIL ARRANGEMENT PLAN - 4F NORTHWEST

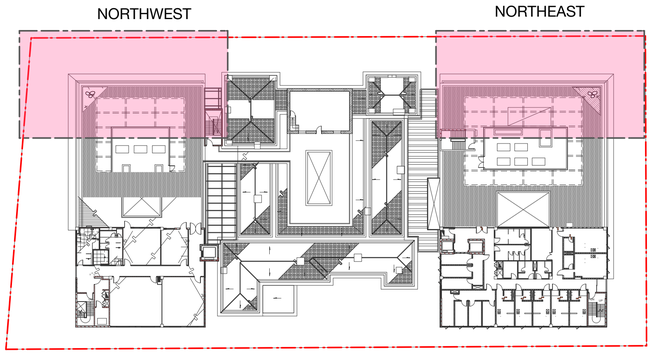
scale: 1:100@A1




## DETAIL ARRANGEMENT PLAN - 4F NORTHEAST

scale: 1:100@A1

0 2 4 6 8 M




## KEY PLAN - 4F

scale: NTS

## LEGEND

- Lot boundary
- Easement line
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- Existing trees to be retained
- Steel edge - refer to detail

### TREES

| | |
|---|---|
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| PRU shi | *Prunus 'Shimidsu Sakura'* Japanese Flowering Cherry |
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| WES fru | *Westringia fruticosa* Coastal Rosemary |
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| AGA afr | *Agapanthus africanus* African Lily |
| POL mun | Polystichum munitum Western Sword Fern |
| BLE gib | Blechnum gibbum Blechnum Silver Lady Fern |

### MASS PLANTING / HEDGING (3-4/m²)

| | |
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| MP2 | *Trachelospermum jasminoides* Star Jasmine |
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| MP4 | *Liriope muscari* Liriope muscari Variegata |

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dwp
Engineer: Cardno Shaping the Future

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| E | 2/8/19 | FOR TENDER | CX |
| F | 6/4/20 | FOR COORDINATION | CX |

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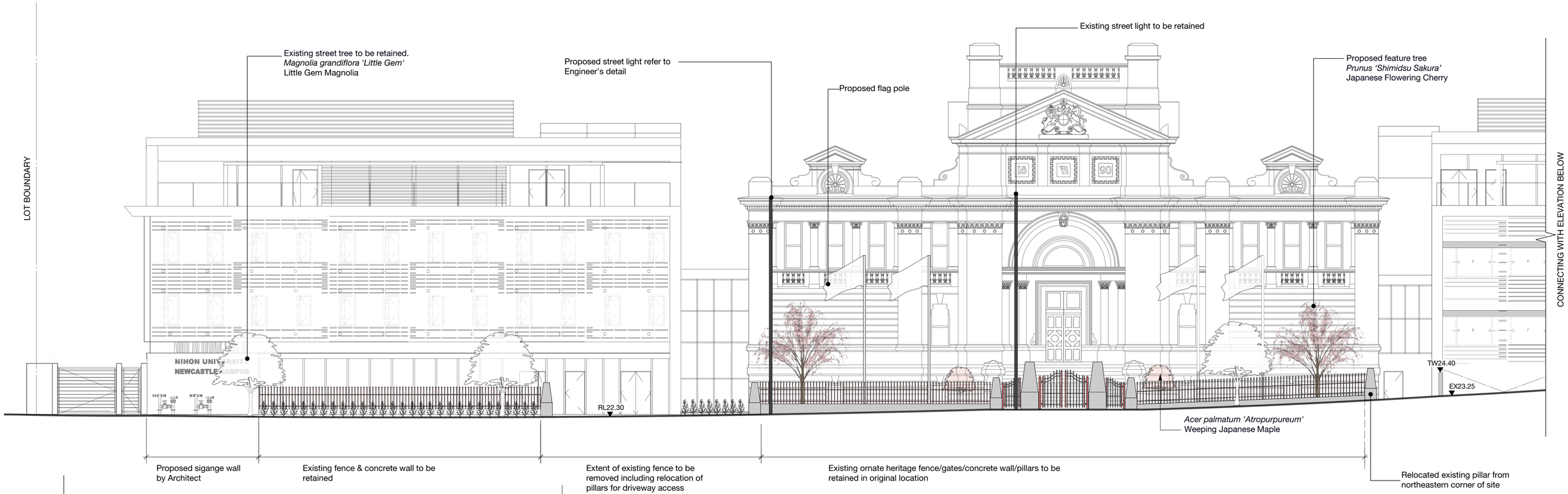
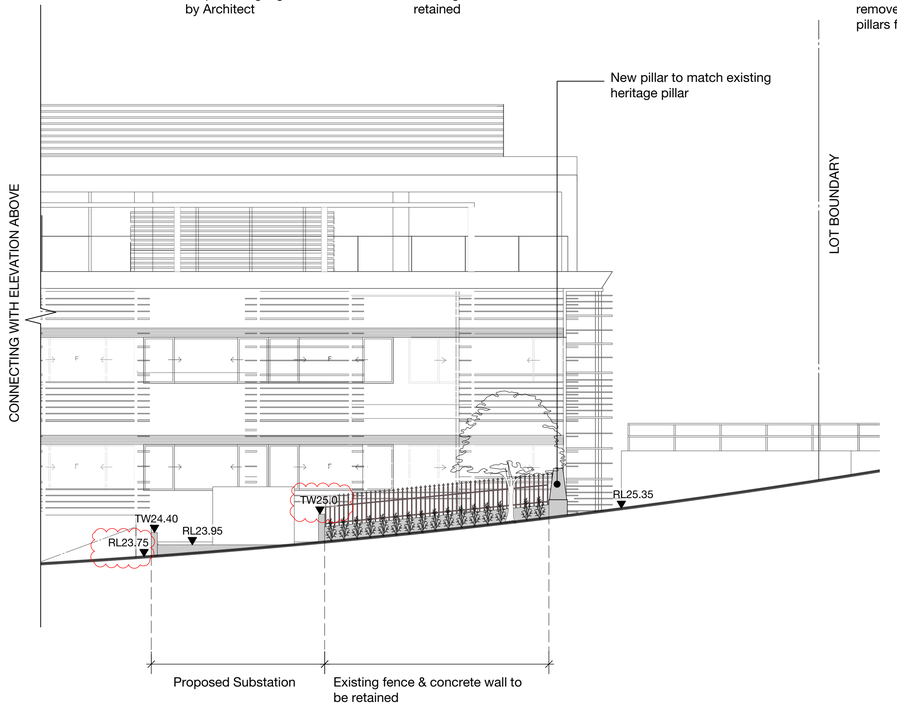
## ARRANGEMENT PLAN - 4F

SCALE: 1:100@A1
ORIGINAL DRAWING AT A1.

Drawn By: CX
Checked By: MW

Project No. 1691
Drawing No. LP07 Rev F




## NORTH ELEVATION - CHURCH STREET

scale: 1:100@A1

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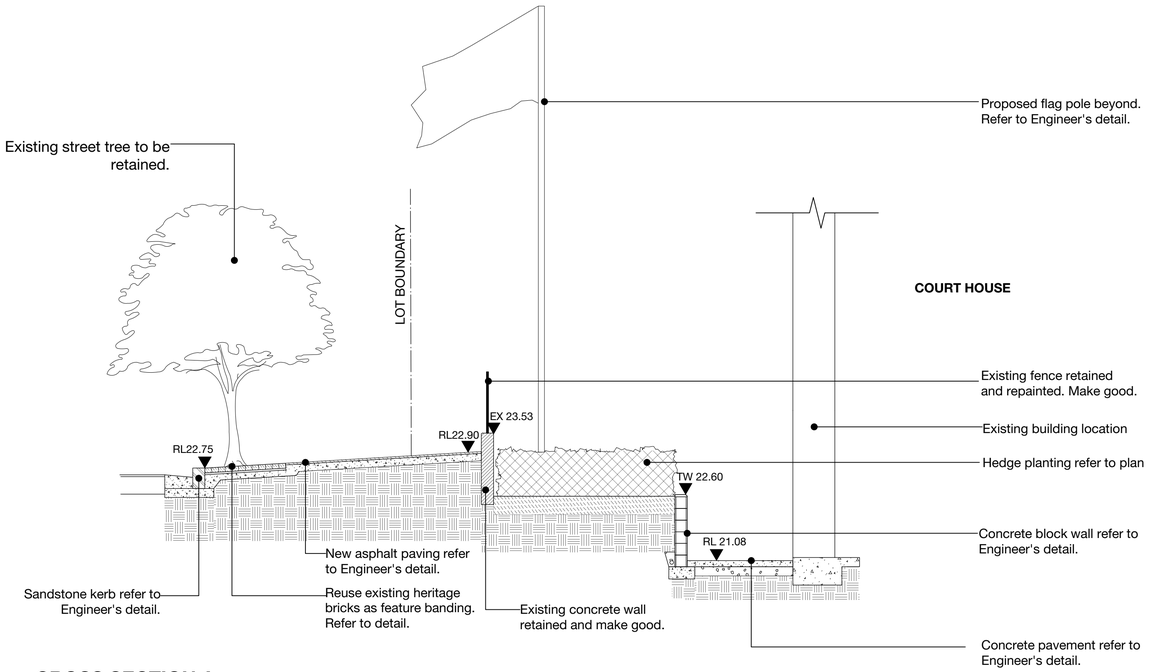
**NORTH ELEVATION**

SCALE: 1:100@A1
ORIGINAL DRAWING AT A1.

Drawn By: CX
Checked By: MW

Project No. **1691**
Drawing No. LP10 Rev G




## CROSS SECTION A

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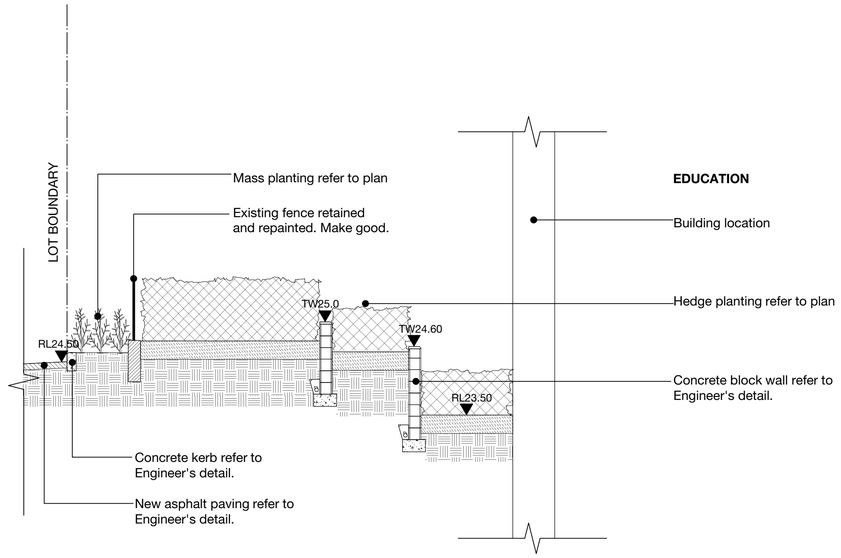


## CROSS SECTION B

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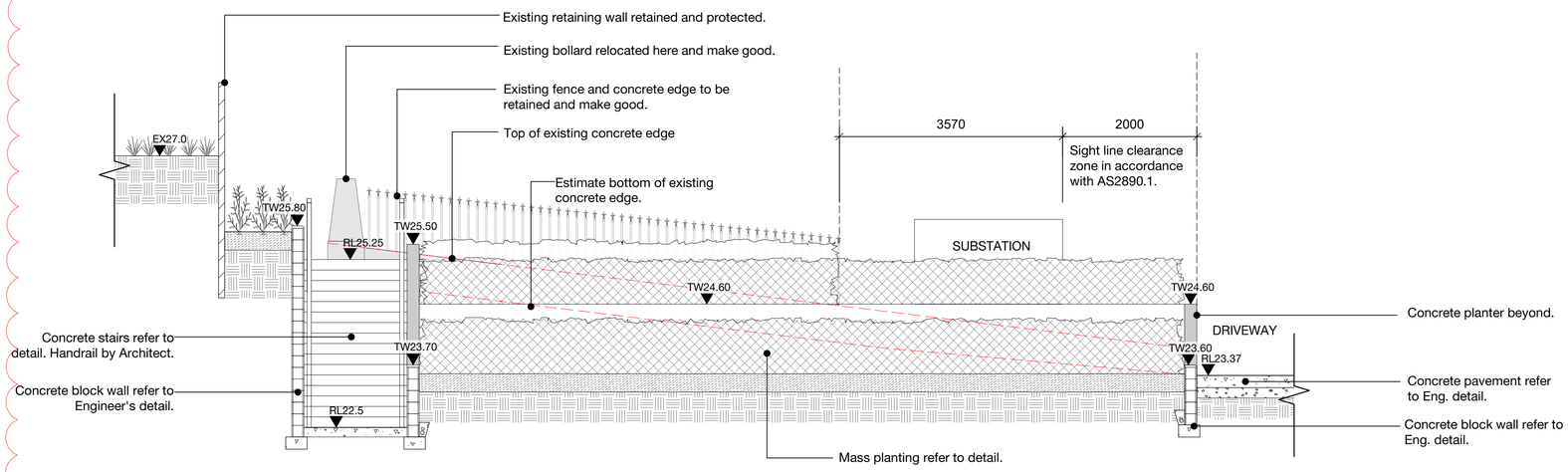


## CROSS SECTION B

scale: 1:50@A1


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dwp
Engineer: Cardno Shaping the Future

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| F | 16/3/20 | FOR COORDINATION | CX |
| G | 6/4/20 | FOR COORDINATION | CX |

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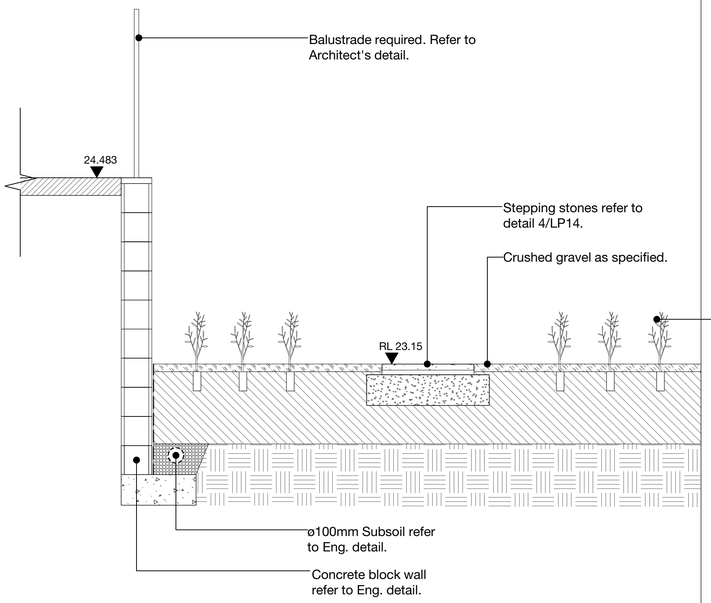
**SECTIONS - 1**

SCALE: AS SHOWN
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW

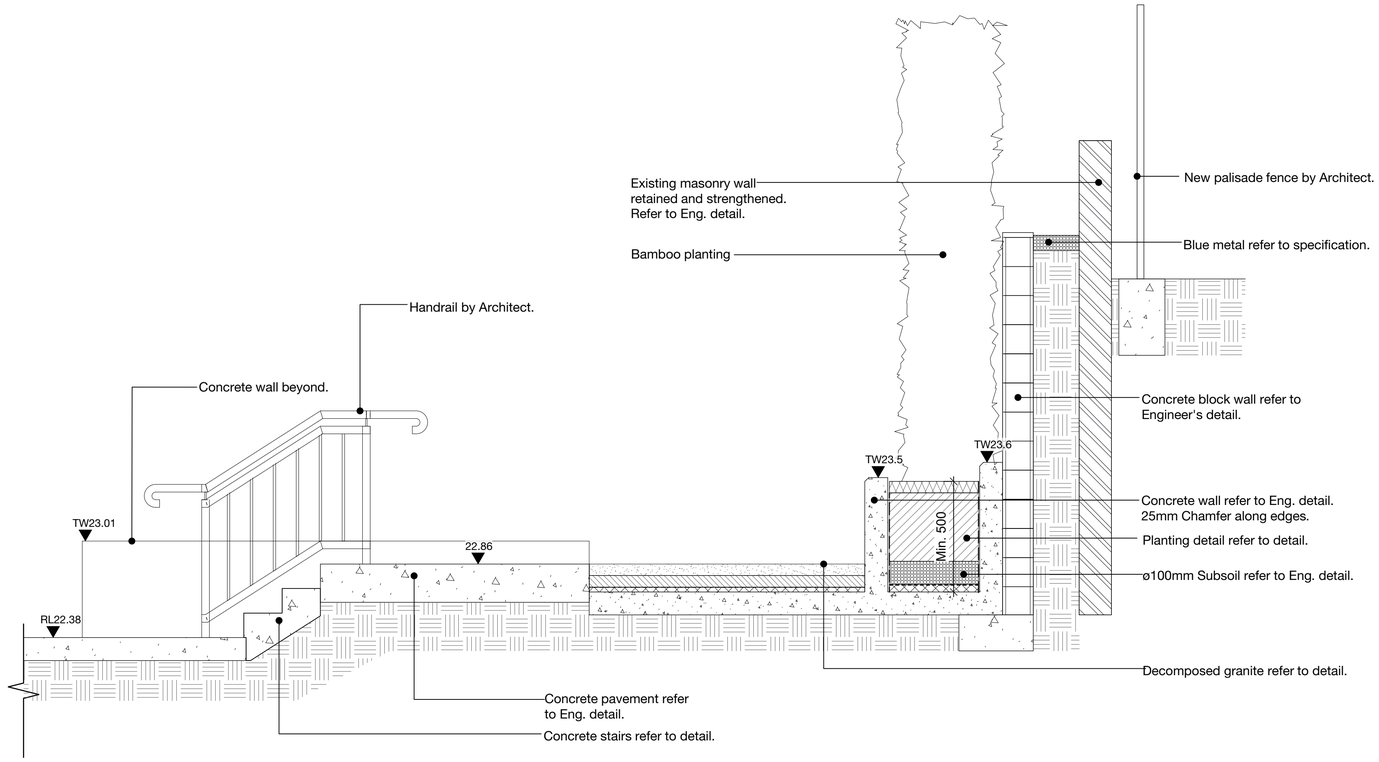
Project No. **1691**
Drawing No. Rev
LP11 G




## CROSS SECTION D

scale: 1:20@A1

**RESIDENTIAL**




## CROSS SECTION E

scale: 1:20@A1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Engineer: Cardno Shaping the Future

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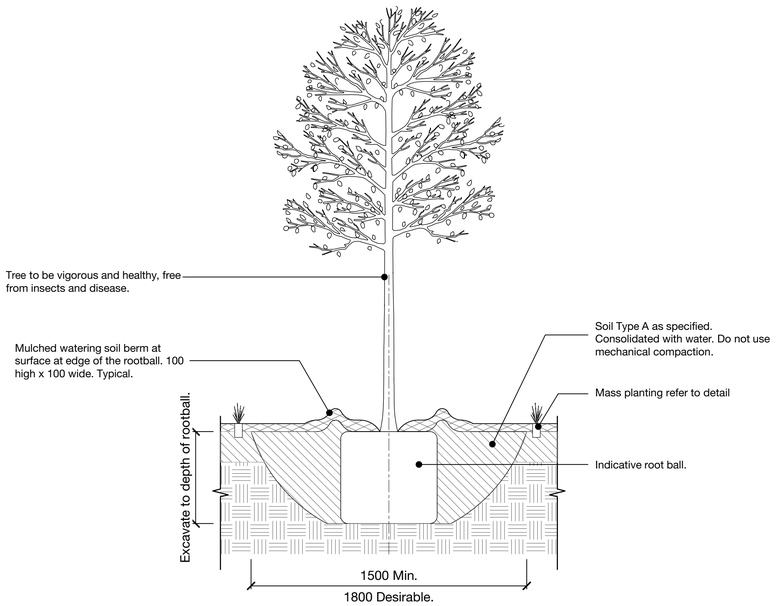
**SECTIONS - 2**

SCALE: AS SHOWN
ORIGINAL DRAWING AT A1.

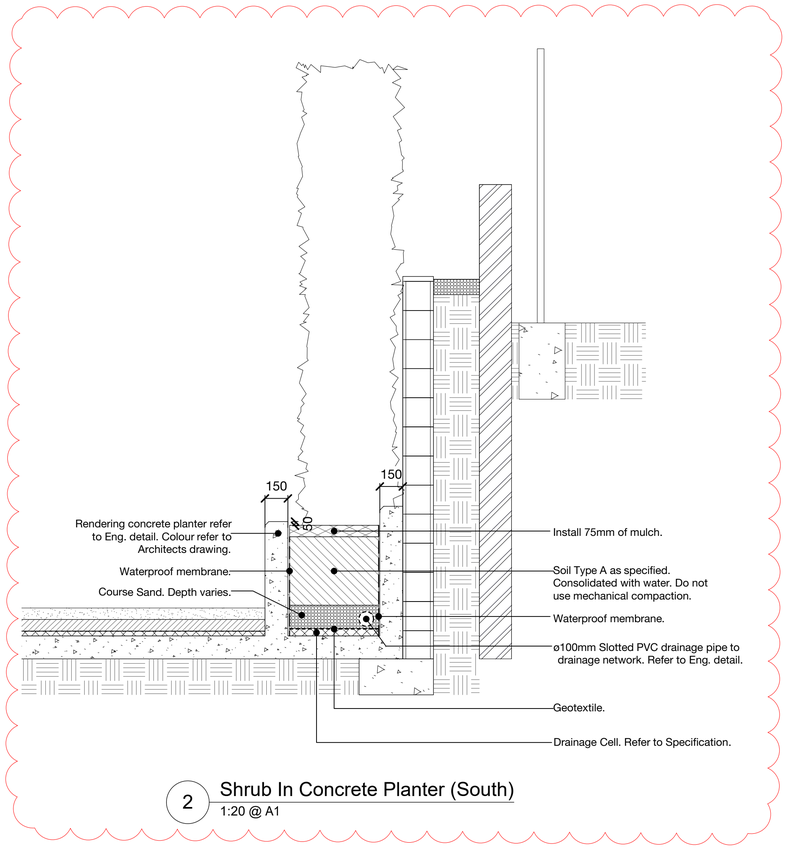
Drawn By: CX
Checked By: MW

Project No. **1691**

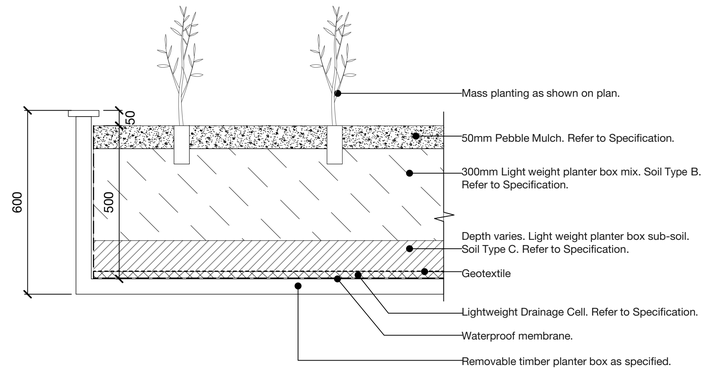
Drawing No. Rev
LP12 G



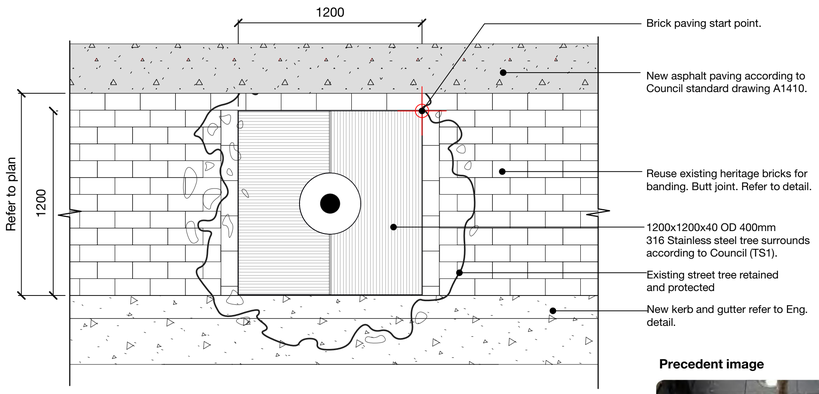

1 Tree With Mass Planting (North)
1:20 @ A1




2 Shrub In Concrete Planter (South)
1:20 @ A1



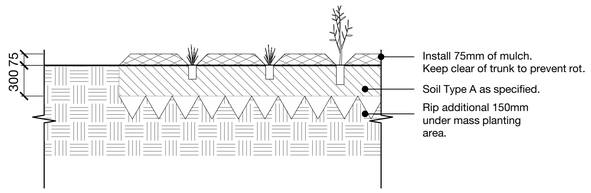

3 Timber Planter Box - Soil Profile
1:10 @ A1



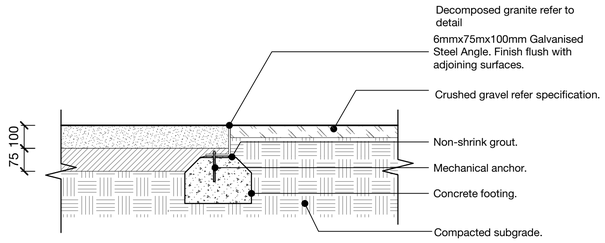

4 Existing Street Tree Detail Plan
1:20 @ A1

**Precedent image**

Tree surrounds streetscape (TS1)
from City Centre Public Domain Technical Manual




5 Mass Planting - Typical
1:20 @ A1




6 Steel Edge
1:10 @ A1

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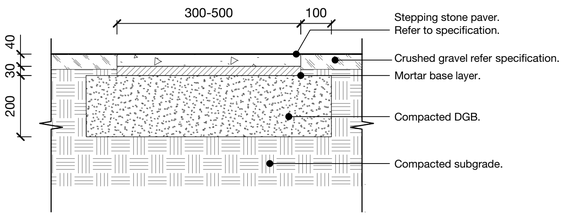
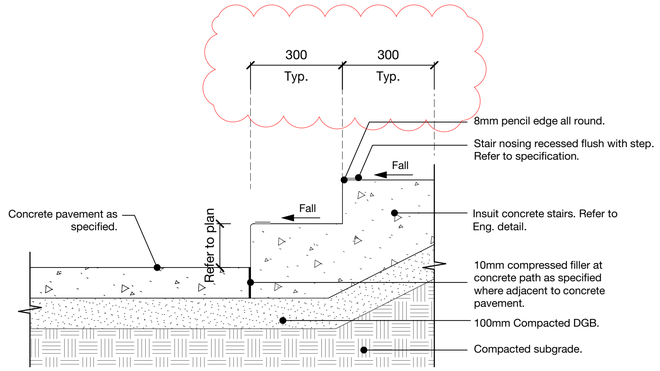
**PLANTING DETAILS**

SCALE: AS SHOWN
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW

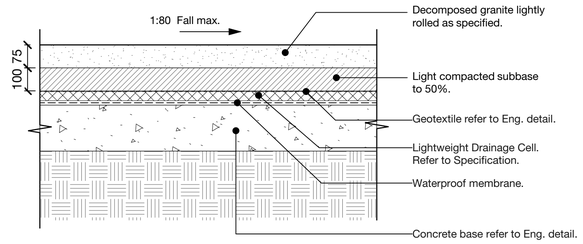
Project No. **1691**
Drawing No. Rev
LP13 G



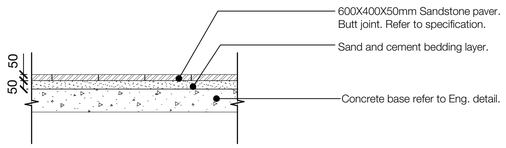

1 Stepping Stone Pavers
1:10 @ A1



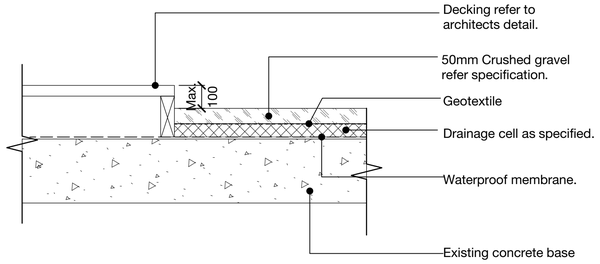

2 Concrete Stairs Detail
1:10 @ A1



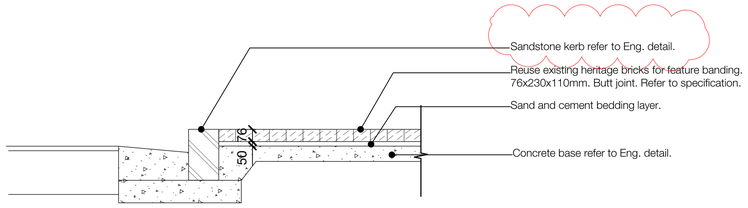

3 Decomposed Granite Detail
1:10 @ A1




4 Sandstone Paving
1:20 @ A1




5 Crushed Gravel - Rooftop
1:10 @ A1




6 Brick Paving
1:20 @ A1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N O T E S:

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5. CONFIRM LOCATION OF ALL SERVICES ON SITE PRIOR TO EXCAVATION.
6. DRAWINGS TO BE PRINTED IN COLOUR ONLY

Architect: AZUSA SEKKEI Architects, Engineers & Consultants
dwp
Engineer: Cardno Shaping the Future

| No. | Date | REVISION | By |
|---|---|---|---|
| A | 6/6/19 | DRAFT | CX |
| B | 26/6/19 | 85% DRAFT | CX |
| C | 5/7/19 | 90% DRAFT | CX |
| D | 11/7/19 | FOR COORDINATION | CX |
| E | 2/8/19 | FOR TENDER | CX |
| F | 16/3/20 | FOR COORDINATION | CX |
| G | 6/4/20 | FOR COORDINATION | CX |

North

Status
FOR COORDINATION
NIHON UNIVERSITY AUSTRALIA
NEWCASTLE CAMPUS
9 CHURCH STREET, NEWCASTLE

NIHON UNIVERSITY

**DETAILS**

SCALE: AS SHOWN
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW

Project No. **1691**
Drawing No. Rev
LP14 G

# SPECIFICATIONS:

## SECTION A: TREE SUPPLY SPECIFICATION - AS2303:2015

Trees to be supplied in accordance with AS2303:15 Tree Stock for landscape use.

## SECTION B: PLANTING SPECIFICATION

### 1.0 GENERAL

**1.1 EXISTING SERVICES**
Existing services on site include storm water drainage, water, and associated power service conduits. Locations of all services should be established prior to excavation of planting holes and installation of trees. The drawings DO NOT indicate the extent of existing services. Existing services must be confirmed by the contractor prior to excavation. Do not excavate by machine within 1m of existing underground services without prior approval or identification of service location.

**1.2 SITE CLEARING**
Extent
Requirement: Clear only areas to be occupied by works such as structures, paving, excavation, regrading and landscaping or other areas designated to be cleared.

Clearing and grubbing
Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.
Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth of 500 mm below subgrade under buildings, embankments or paving, or 300 mm below finished surface in unpaved areas. Backfill holes remaining after grubbing with sand material to prevent ponding of water. Compact the material to the relative density of the existing adjacent ground material.
Redundant/decommissioned works: Remove works, including slabs, foundations, pavings, drains and access chambers covers found on the surface.

Surplus material
Topsoil and excavated material: Continually remove unwanted stripped soil and other material from the site as the work proceeds, including any material dropped on footpaths or roadways.

**1.3 PROTECTION OF EXISTING FEATURES**
During installation protect all existing trees, shrubs and other specified vegetation, features and improvements, structures and utilities. Protect trees to be retained from damage from groundworks. Take necessary precautions, including the following:

Harmful Materials: Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks, even for short periods. Prevent wind blown materials such as cement from harming trees and plants.
Damage: prevent damage to tree bark. Do not attach stays, guys and the like to trees.
Work under trees: Do not add or remove topsoil within the drip line, use hand methods such that root systems are preserved intact and undamaged. Open up excavations under tree canopies for as short a period as possible.
Roots: Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system.
Compacted Ground: Avoid compaction of the ground under trees.

**1.4 TREES TO BE REMOVED**
Designation
Marking: Mark trees and shrubs to be removed 1000 mm above ground level.

**1.5 TREE PROTECTION**
**General**
Warning signs: Display in a prominent position at each entrance to the site, warning that trees and plantings are to be protected during the contract. Remove on completion.
Lettering: Road sign type sans serif letters, 100 mm high to AS 4970 Appendix C.
Protection measures: Provide before commencement of earthworks.
**Trees to be retained**
Extent: All trees NOT marked for removal.
**Tree protection**
Tree protection zone (TPZ): To AS 4970 Section 3.
Tree protective measures: To AS 4970 Section 4.
Monitoring and certification: To AS 4970 Section 5.
**Work near trees**
Harmful materials: Conform to the following:
- Keep the area within the dripline free of sheds and paths, construction material and debris.
- Do not place bulk materials and harmful materials under or near trees.
- Do not place spoil from excavations against tree trunks.
- Prevent wind-blown materials such as cement from harming trees and plants.

Damage: Prevent damage to tree bark. Do not attach stays, guys and the like to trees.
Work under trees: Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.
Excavation: If excavation is required near trees to be retained, give notice. Minimise period of excavation under tree canopies.
Hand methods: Use hand methods to locate, expose and cleanly remove the roots on the line of excavation. If it is necessary to excavate within the drip line, use hand methods so that root systems are intact and undamaged.
Roots: Do not cut tree roots exceeding 50 mm diameter. Where it is necessary to cut tree roots, use cutting methods that do not excessively disturb the remaining root system. Immediately after cutting, water the tree and apply a liquid rooting hormone to stimulate the growth of new roots.
Backfilling: Backfill excavations around tree roots. Place the backfill in layers of 300 mm maximum depth and compacted to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 200 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.
Backfill material:
- Mix proportions (topsoil:well-rotted composts) by volume: 3:1.
- Neutral pH value.
- Free from weed growth and harmful materials.

Compacted ground: Do not compact the ground or use skid-steel vehicles under the tree dripline. If compaction occurs, give notice.
Compaction protection: Protect areas adjacent the tree dripline. Submit proposals for an elevated platform to suit the proposed earthworks machinery.
Watering: Water trees as necessary, including where roots are exposed at ambient temperature more than 35°C.
Mulching: Spread 100 mm thick organic mulch to the whole of the area covered by the drip line of all protected trees.

### 2.0 MATERIALS

**2.1 PLANT MATERIAL**
Discrepancies within the planting schedule and the drawing should be referred to Moir Landscape Architecture for clarification. Make no substitutions unless approved. Substitutions shall not be approved unless the contractor complies with this specification.

Plant material: Plants shall be of the species, sizes and quantities as shown on the drawing. Plants shall be vigorous, well established, of good form, not soft or forced, free from disease and insect pests. Plants shall have large healthy root systems.

**2.2 SOILS & MULCH**

**SOIL TYPE A:**
Top 300mm soil to be equal to AS4419-2018 'Organic Soil' with texture to AS4419-2018 Table 1- Sandy Loam.
Below 300mm do not incorporate organic matter. Below 300mm soil to be equal to AS4419-2018 'Soil blend' with max 5% organic matter content. Texture to AS4419-2018 Table 1- Sandy Loam.

**SOIL TYPE B:**
Imported Top Soil - Benedict smart Mix No.4 - Lightweight planter box mix, or equivelent product as approved by superintendant.
Installation: Install to a depth of 300mm
Supplier (recommended): Benedict Industries ph. (02) 9986 3555, web. benedict.com.au

**SOIL TYPE C:**
Imported Sub-soil - Benedict Smart Mix No.5 - lightweight planter box subsoil mix, or rquivelent product as approved by superintendant.
Installation: Install to a depth of 300mm
Supplier (recommended): Benedict Industries ph. (02) 9986 3555, web. benedict.com.au

General: Where available use ameliorated site topsoil. Where unavailable Import topsoil from an off-site source approved by the Superintendent.

Source Landscape Soil:
Soil to be used for these landscape works shall be: Imported General Purpose Soil to the areas and locations as specified. Soil for the works shall be free from noxious weeds etc. Soil shall be assumed to be placed to all areas and backfill to all plantings. Unless otherwise directed by site superintendent, the landscape contractor is responsible for the removal and or disposal of all spoil or excess soil excavated in the process of implementing the landscape works.

Sampling: As recommended in AS 4419 (2003) Appendix A (when on site soil is to be used).
Sampling technique: The following sampling technique should be used in conjunction with the guidelines recommended in AS 4419 (2003). Where discrepancies arise, refer to the Superintendent for clarification prior to proceeding with any works.

The Contractor shall arrange for the following soil tests to be carried out:
• Three tests of any proposed imported topsoil.

For each test, take six samples of each soil type. These should be taken from various locations. Each sample should be approximately a spade full in quantity. For each soil type, thoroughly mix the six samples together to obtain an 'average' sample. Ensure that mixing is carried out in a clean mixing container, with no impurities such as cement residue or imported soil etc present. Extract 1kg (approximately a 2L ice cream container) final samples from each of the three mixed batches. Package and forward to the soil laboratory for testing, together with a site plan locating sources of soil samples and a record of any relevant details about the site and source locations.

Results: The results of all soil tests should be submitted to the superintendent when available.

Lead time: Allow a minimum of five full working days for completion of soil testing, and check with laboratory to ensure testing will not delay landscaping works. Supply soil tests to site superintendent once available.

**MULCH:**
Mulch type: Coarse Grade mulch in accordance with AS4454-2018. Free of deleterious and extraneous matter including soil, weeds and sticks. Do not include fine mulch.
Supplier & product: ANL 'Forest Fines'. Phone: 02 9450 1444 Fax: 02 9450 2428

**PEBBLE MULCH:**
To be used where indicated on LP401. Mulch in Soil Profile Type 1.
Type: Nepean River Pebble 10mm
Supplier: ANL - Australian Native Landscapes Pty Ltd
Contact: Hue Hue Road, Jilliby NSW, 2259 (02) 43536025. anlandscape.com.au
Depth: 50mm.

### 3.0 EXECUTION

**3.1 EXCAVATION OF PLANTING HOLES**
Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of the stakeout by the supervisor is required before excavation begins. Tree pits are to be excavated to the depth and widths indicated on the drawings. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped. The sides of the excavation of all planting areas shall be sloped at 45 degrees. The bottom of the planting hole shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed. The bottom of the planting hole directly under any tree shall be horizontal such that the tree sits plumb.

Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.

Subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill in any planted or lawn area. Excavations shall not be left uncovered or unprotected overnight. For trees and shrubs planted in individual holes in areas of good soil that is to remain in place and/or to receive amendment in the top 150mm layer, excavate the hole to the depth of the root ball and to widths shown on the drawing. Slope the sides of the excavation at a 45 degree angle up and away from the bottom of the excavation.

Preparation of subgrades to be inspected prior to the installation or modification of topsoil or planting mix. Till the subsoil into the bottom layer of topsoil or planting mix. Loosen the soil of the subgrade to a depth of 50 to 75 mm with a rototiller or other suitable device.

Detrimental soil conditions: The supervisor is to be notified, in writing, of soil conditions encountered, including poor drainage, that the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to resolve the conditions are received.

Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the landscape architect.

**3.2 PLANTING OPERATIONS**
Before planting begins thoroughly water the plants and planting areas. Water plants again immediately after planting.

Subsurface drainage etc
Install subsurface drains as shown on the details and connect to Stormwater. All tree planting holes and mass planting areas shall have subsurface drainage.

Trees
Plants shall be set on flat-tamped or unexcavated pads at the same relationship to finished grade as they were to the ground from which they were dug, unless otherwise noted on the drawings. Plants must be set plumb and braced in position until topsoil or planting mix has been placed and thoroughly watered in to stabilise the root ball of the tree (Do not tamp down soil). Improper stabilization of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.

Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery. If the root flare is less than 50mm below the soil level of the root ball, plant the tree at the appropriate level above the grade to set the flare even with the grade. If the flare is more than 50mm at the center of the root ball the tree shall be rejected.

Lift plants only from the bottom of the root balls or with belts or lifting harnesses of sufficient width not to damage the root balls. Do not lift trees by their trunk or use the trunk as a lever in positioning or moving the tree in the planting area.

Remove plastic, paper, or fiber pots from containerised plant material. Score the side of the root ball with a sharp knife and tease out roots. Immediately after removing the container, install the plant such that the roots do not dry out. Pack planting mix around the exposed roots while planting. Completely remove any waterproof or water-repellant strings or wrappings from the root ball and trunk before backfilling.

Soils and mulch
Place soil mixes, tamping lightly to reduce settlement. Ensure that the backfill immediately around the base of the root ball is tamped with foot pressure sufficient to prevent the root ball from shifting or leaning.

Thoroughly water all plants immediately after planting. Apply water by hose directly to the root ball and the adjacent soil. Remove all tags, labels, strings, etc. from all plants. Remove any excess soil, debris, and planting material from the job site at the end of each workday.

Fine Grading
Provide smooth transitions between slopes of different gradients and direction. Modify the grade so that the finish grade is flush with all paving surfaces or as directed by the drawings. Fill all dips and remove any bumps in the overall plane of the slope.

Staking
For Trees, stake as per the details.

Pruning
Plants shall not be heavily pruned at the time of planting. Pruning is required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers, and interfering branches. Healthy lower branches and interior small twigs should not be removed except as necessary to clear walks and roads. In no case should more than one-quarter of the branching structure be removed. Retain the normal or natural shape of the plant. All pruning shall be completed using clean, sharp tools. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears.

Mulching
All trees are to be mulched to the depths shown on the drawing. Mulch must not be placed within 8 cm of the trunks of trees. Spread 75mm layer mulch to all mass planting beds and individual plantings in turf. Finish to the required levels. Keep mulch away from the plant stems.

## SECTION C: LANDSCAPE MAINTENANCE SPECIFICATION

### 1.0 SCOPE

**1.1 PERIOD**
The 26 week Planting Establishment Period commences at the date of Practical Completion.

The contractor is to also allow for maintenance from the date of Practical Completion to the start date of the 26 week Planting Establishment Period. The allowance shall be for a weekly rate which will then be implemented until the formal maintenance period commences.

**1.2 PROGRAM**
Furnish a proposed planting maintenance program with the tender.

**1.3 MAINTENANCE LOGBOOK**
Contractor to keep a maintenance record of works carried out on a monthly basis. Log should include but not limited to:
- Activities carried out during each attendance;
- Irregularities encountered and actions taken;

NB: Maintenance payments will be evaluated on submission of monthly logbooks.

**1.4 RECURRENT WORKS**
Throughout the Planting Establishment Period, continue to carry out recurrent works of a maintenance nature including, but not limited to, watering, mowing, weeding, rubbish removal, fertilising, pest and disease control, staking and tying, replanting, cultivating, pruning and keeping the site neat and tidy. All rubbish related to landscape works shall be removed by the landscape contractor before it is allowed to accumulate.

**1.5 PLANTING**
Commence recurrent planting maintenance works at the completion of planting. Ensure the stock arriving on site is protected and maintained for healthy growth.

**1.6 REPLACEMENTS**
Continue to replace failed, damaged or stolen plants for the extent of the Planting Establishment Period.

**1.7 MULCHED SURFACES**
Maintain the surface in a clean and tidy condition and reinstate the mulch as necessary.

**1.8 GRASSED AREAS**
Commence grass maintenance works at the completion of turfing, and continue to carry out grass maintenance throughout the contract and Planting Establishment Period, maintaining healthy weed free growth.

**1.9 STAKES AND TIES**
Adjust or replace as required. Remove those not required at the end of the Planting Establishment Period.


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Architect: AZUSA SEKKEI Architects, Engineers & Consultants
Engineer: Cardno Shaping the Future

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North

Status
FOR COORDINATION
NIHON UNIVERSITY AUSTRALIA
NEWCASTLE CAMPUS
9 CHURCH STREET, NEWCASTLE

NIHON UNIVERSITY

**SPECIFICATIONS**
SCALE: NTS
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW
Project No. 1691
Drawing No. LP15 Rev F

# SPECIFICATIONS:

**1.11 WATERING**
Generally: Maintain a vigorous healthy appearance.
Site Water: The contractor shall be responsible for supplying water and/or paying for water for the duration of the works.
Timing: Water at times of day to minimise water evaporation loss. Do not water during the hottest period of Summer days.
Public areas without installed watering systems: Water in dry periods. Make available all necessary equipment to carry out hand and sprinkler watering as required.
Water restrictions: Coordinate the water supply and confirm the watering regime against federal and state government legislation and restrictions at the time.
Hand watering: Manually water all lawn and planting areas in the absence of an irrigation system or until the proposed irrigation system is fully operational.

## 2.0 REPORTS

**2.1 LANDSCAPE PRACTICAL COMPLETION REPORT**
Following an inspection of the installed landscape, Moir Landscape Architecture is to submit a 'Landscape Practical Completion Report' to the Principle Certifying Authority. This report will confirm that the landscape has been installed as per the approved plans, or outline any deviations from the plans, and any rectifications required.

**2.2 LANDSCAPE MAINTENANCE REPORT**
'Landscape Maintenance Reports' shall be submitted to the Principle Certifying Authority by the contractor verifying that satisfactory maintenance of the landscape works has been undertaken and that any necessary rectification measures have been carried out to a high professional standard. This documentation is to be submitted through the plant establishment period.

**PLANT ESTABLISHMENT & MAINTENANCE PERIOD:**
The planting establishment period shall be 26 weeks during which time the landscape contractor shall undertake the following.

MAINTENANCE LOGBOOK:
Contractor to keep a maintenance record of works carried out on a monthly basis. Log should include but not limited to:
- Activities carried out during each attendance;
- Irregularities encountered and actions taken;

PLANTING:
Commence recurrent planting maintenance works at the completion of planting. Ensure the stock arriving on site is protected and maintained for healthy growth.
Replacements: Continue to replace failed plants or plants damaged during site works. Report any vandalism or theft immediately.

RECURRENT WORK:
Throughout the planting establishment period carry out maintenance work including: watering, weeding, rubbish removal, fertilising, pest and disease control, replanting and, reinstatement of mulch, and keeping the site neat and tidy. Any additional work required should be undertaken and documented in the maintenance log book.

MULCHED SURFACES:
Maintain the surface in a clean and tidy condition and reinstate the mulch as necessary.

# SECTION D: HARDWORKS

## 1.0 EDGING
Steel edge to be used between crushed gravel and organic mulch. Refer to landscape plan for detailed location.

**STEEL EDGE**
General: Galvanised steel edge
Standard: To AS4680
Size and profile: 75x75mmx5mm Equal angle with HDG and 100mm x 6mm steel plate.
Finish: Hot-dip galvanised.
Refer to landscape detail.

## 2.0 DRAINAGE CELLS
General: Drainage cells are to be installed beneath the planter troughs as per details unless approved otherwise by site superintendant. Drainage cells must be connected to drainage outlet as per engineer's detail.
Type: 52mm Flo-Cell
Dimensions: 52mm (H) x 260mm (W) 480mm (L)
Supplier: Atlantis (3/19-21 Gibbes St, Chatswood, NSW 2067. 02 9417 8344)

## 3.0 PAVING

**CONCRETE**
Scope: Refer to plans for locations. Details refer to engineerings drawing.
Construction is to AS 3600. Set out to dimensions and falls as indicated on engineerings drawing.
Colour: Natural

**CRUSHED GRAVEL**
General: Angular crushed white limestone gravel graded to 10mm in size. Spread loose material over the compacted base.
Thickness: Screed to minimum 50 mm thick.
Colour: White
Supplier: Australian Native Landscapes (ANL) supplies or similar approved.
Refer to landscape detail.

**DECOMPOSED GRANITE**
General: Mix 75% gold granite, 25% Rutolite, 2% dry weight soil bond granite sand stabiliser. Do not add water to surface material. Allow the natural ground water to rise and stabilise the mixture. Product to be factory premixed not site mixed. Spread blended dry mix over compacted subgrade. Product to be factory premixed not site mixed. Lightly rolled.
Thickness: Screed to minimum 75 mm thick.
Compaction: 90% of the maximum dry density.
Supplier: Australian Native Landscapes (ANL) supplies or similar approved.
Refer to landscape detail.

**STEPPING STONES**
General: Natural schist stone steppers.
Size: The size of the natural stone vary between 300 - 500mm, average 300x500x40mm.
Colour:Grey
Supplier: Bunnings Warehouse supplies or similar approved.
Refer to landscape detail.

**SANDSTONE PAVING**
Type: Mount White Sandstone
Colour: Brown
Size: 600X400X50mm
Supplier: Gosford Quarries supplies or similar approved.
Refer to landscape detail.

**BRICK PAVING**
General: Reuse existing heritage bricks in horizontal pattern for feature banding. Refer to landscape plan.
Colour: Red and brown
Size: Typically 76x230x110mm
Refer to landscape detail.

## 4.0 FIXTURES & FURNITURE

**TACTILE GROUND SURFACE INDICATORS (TGSI)**
Type: Discreet tactile, Polyurethane with star shaft
Colour: Black
Location: As shown on the plan.
Supplier: Pathfinder Systems or equivalent approved
To confirm to the recommendation of AS/NZS 1428.1.
Refer plans for location information.
Install to manufacturer's instruction.

**STAIR NOSING**
Type: SC12 Aluminium Ripple Trim.
Colour: Black & silver.
Supplier: Pathfinder Systems or equivalent approved.
Install to manufacturer's instruction.
AS1428.1:2009 Design for Access and Mobility compliant.

**WIRE TRELLIS VERTICAL**
General: 7 x 19 stainless steel wire, wire trellis at 3.2mm.
Material: Stainless steel
Location: As shown on the plan.
Supplier: Miami Stainless (https://spec.miamistainless.com.au)
Fixing /install to manufacturer's instruction.

**TIMBER PLANTER BOX**
General: Removable timber planter box on wheels.
Type: Garbolino 470mm x 1250mm, 600mm high. Food grade liners.
Location: As shown on the plan.
Material & Finish: Hardwood capping and organic timber, screwless.
Supplier: Modbox (www.modbox.com.au) or equivalent approved.

## TREE INSPECTION FORM

**General**

| | | | |
|---|---|---|---|
| Date | | Special requirements | |
| Purchaser | | Reference | |
| Supplier | | Inspected by (supplier/purchaser/agent) | |
| Species | | Batch identification | |
| Number of trees in batch | | Container/rootball size | |
| Height range | | Calliper range | |

**Above ground**

| | | |
|---|---|---|
| Labelling | ❑ | |
| Health and vigour | ❑ | |
| Free from pests/disease | ❑ | |
| Free from injury | ❑ | |
| Self-supporting | ❑ | |
| Stem taper | ❑ | |
| Pruning | ❑ | |
| Apical dominance | ❑ | |
| Crown symmetry | ❑ | |
| Stem structure | ❑ | |
| Included bark | ❑ | |
| Trunk position | ❑ | |
| Compatibility of graft unions | ❑ | |
| Indication of north | ❑ | |

**Below ground**

| | | |
|---|---|---|
| Inspection method used | ❑ | External only |
| | ❑ ❑ | External plus investigative destructive ❑ partial |
| Number of trees in sample | ❑ | |
| Root division | ❑ | |
| Root direction | ❑ | |
| Dia. nonconforming roots at rootball extremity | ❑ | |
| Rootball occupancy | ❑ | |
| Rootball depth | ❑ | |
| Height of root crown | ❑ | |
| Non-suckering rootstock | ❑ | |

**Balance**

| | | |
|---|---|---|
| Balance | ❑ | |
| | | |
| | | |
| | | |
| | | |

**Conformance with specification**

| | |
|---|---|
| Conforming | ❑ Yes ❑ No |
| Comments | |
| Name and signature (inspector) | |

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|---|---|---|---|
| A | 6/6/19 | DRAFT | CX |
| B | 26/6/19 | 85% DRAFT | CX |
| C | 5/7/19 | 90% DRAFT | CX |
| D | 11/7/19 | FOR COORDINATION | CX |
| E | 2/8/19 | FOR TENDER | CX |
| F | 6/4/20 | FOR COORDINATION | CX |

North

Status
FOR COORDINATION
NIHON UNIVERSITY AUSTRALIA
NEWCASTLE CAMPUS
9 CHURCH STREET, NEWCASTLE

NIHON UNIVERSITY

**SPECIFICATIONS**
SCALE: NTS
ORIGINAL DRAWING AT A1.
Drawn By: CX
Checked By: MW
Project No. 1691
Drawing No. LP16 F
Rev