

Sydney Metro WSA - SSTOM - OHE – Lansdowne and Samuel Marsden Roads Sewer Main - Environmental Review 003

SMWSASSM-PLD-OHE-SN150-SP-RPT-000002

Parklife Metro D&C

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Planning Approval Environmental Review Form

SM-22-00008046

Sydney Metro – Metro Body of Knowledge (MBoK)

Assessment Name:	Orchard Hills Station Sewer Main Lansdowne and Samuel Marsden roads
Prepared by:	Parklife Metro
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Environmental Review

1. Proposed works and justification

An environmental review is applicable to design changes which are consistent with the conditions of approval and would have negligible additional impacts on the community and/or the environment. This environmental review is required to demonstrate compliance with the conditions of approval and the Sydney Metro – Western Sydney Airport (SM-WSA) Environmental Impact Statement (EIS), Submissions Report and EPBC Act Final Environmental Impact Assessment of off-airport proposed action (off-airport Final EIA). A description of activities is listed in Table 1 and an assessment provided in Section 2.

Table 1 Description of proposed works

Description	Overview
Location of works	<p>The proposed sewer main route will run from the Orchard Hills Station along Lansdowne Road and Samuel Marsden Road to connect to the existing Sydney Water DN1350 South Creek sewer submain located in private property at [REDACTED] [REDACTED]</p> <p>The location of works is shown in Figure 1 below and in the detailed Figures in Appendix A. Work would be generally located within the road reserve with the exception of the connection to the existing submain.</p>
Scope of works	<p>The scope of work includes investigation stage and construction stage work for the Lansdowne/Samuel Marsden sewer main. The scope of work does not include work on Lansdowne Road where work is within the existing approved construction footprint.</p> <p>Investigations</p> <p>Utility investigations will supplement initial desktop studies and ‘Dial Before You Dig’ (DBYD) information. The works will provide positive confirmation of utility locations to finalise design and ensure safety of workers during construction. Geotechnical investigations and soil testing are required to satisfy Sydney Water design requirements. Work will include:</p> <p><u>Utility investigations</u></p> <ul style="list-style-type: none"> • Field inspection and survey • Electronic detection and location and ground penetrating radar (GPR) • Pothole and trench to expose existing services as per utility providers DBYD guidelines <p><u>Geotechnical investigations</u></p> <ul style="list-style-type: none"> • Additional geotechnical bores <p>Construction</p> <ul style="list-style-type: none"> • Installation of approximately 1500 metres (m) of a 375 millimetre (mm) diameter gravity sewer main between Orchard Hills Station and the existing Sydney Water DN1350 South Creek submain. The gravity main, once constructed, will be operated and maintained as part of the Sydney Water wastewater system. • Approximately 16 new maintenance holes at intervals of no greater than 250m along the sewer main • Construction would be through a combination of trenchless and open trench construction methods.

	<ul style="list-style-type: none"> • Trial test and commission new sewer main in accordance with Sydney Water procedures. Works on existing Sydney Water assets will be carried out in conjunction with Sydney Water commissioning crews. • Any disturbed road surface will be reinstated following the completion of works. • The work will be constructed within the road reserve of Lansdowne and Samuel Marsden roads with the exception of the connection to the existing Sydney Water sewer submain (see Appendix A1 Figure). Work in this location will be via underbore from Samuel Marsden Road to connect to the existing maintenance pit. This land is owned by the Minister administering the <i>Environmental Planning and Assessment Act 1979</i> and leased to Penrith City Council. 												
<p>Justification for works</p>	<p>The sewer main is required to provide a permanent wastewater connection for the Orchard Hills Station and precinct as well as to provide capacity for pumped discharge from the Stabling and Maintenance Facility.</p> <p>The design has been developed to meet Sydney Water Notice of Requirements (NOR), which have been issued to Parklife Metro via the approved Water Service Coordinator (WSC).</p> <p>The SM-WSA EIS outlined the approach that would be taken to identify, select and assess additional construction related elements of the project, including utility works. This review addresses that process in Section 2 below.</p>												
<p>Timeframe for works</p>	<p>Investigations (includes non-intrusive and intrusive investigations) will commence as soon as possible following the approval of this environmental review to inform final design:</p> <ul style="list-style-type: none"> • Approx. 2 weeks commencing April 2024, subject to weather and site conditions <p>Construction works:</p> <ul style="list-style-type: none"> • Approx. 7 months commencing August 2024. (Note that pipelaying works will be completed within this timeframe. Testing and commissioning, as well as final cutover and connection will be completed later in the construction program as noted in the table below) 												
<p>Work hours, workforce and equipment / machinery</p>	<p><u>Non-intrusive investigations</u></p> <table border="1" data-bbox="578 1283 1351 1631"> <thead> <tr> <th>Works</th> <th>Method</th> <th>Personnel and equipment</th> </tr> </thead> <tbody> <tr> <td>Survey</td> <td>-Standard survey equipment including tripod and theodolite -Hand operated detection and GPR equipment -Foot access only -Survey would include inverts of utility pits where required and pit lids to be lifted as required -No removal of vegetation for access or survey</td> <td>2 x surveyors 1-2 light vehicles 1 x total survey station / jigger 2 x utility search operators / GPR operators More than 1 survey team may be working</td> </tr> </tbody> </table> <p><u>Intrusive investigations</u></p> <table border="1" data-bbox="578 1707 1351 1856"> <thead> <tr> <th>Works</th> <th>Method</th> <th>Personnel and equipment</th> </tr> </thead> <tbody> <tr> <td>Potholing & slit trenching</td> <td>- Traffic control and barriers as per TMP -Concrete saw for road opening</td> <td>1 x Vacuum Truck 1 x 5t Excavator 1 x Road Saw</td> </tr> </tbody> </table>	Works	Method	Personnel and equipment	Survey	-Standard survey equipment including tripod and theodolite -Hand operated detection and GPR equipment -Foot access only -Survey would include inverts of utility pits where required and pit lids to be lifted as required -No removal of vegetation for access or survey	2 x surveyors 1-2 light vehicles 1 x total survey station / jigger 2 x utility search operators / GPR operators More than 1 survey team may be working	Works	Method	Personnel and equipment	Potholing & slit trenching	- Traffic control and barriers as per TMP -Concrete saw for road opening	1 x Vacuum Truck 1 x 5t Excavator 1 x Road Saw
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	-Vacuum truck or excavator as required -Expose utility and survey -Backfill and make good surface	1 x 8t Tipper 2x Traffic control vehicles 1 x Rammer 1 x Vibrating plate Survey Equipment Up to 10 workers may be on site
Geotechnical borehole	-Standard method with small truck mounted drill rig (or similar) -No removal of vegetation for access or survey	As above Drill-rig

Sewer main construction

Works	Method	Personnel and equipment
Excavation	-Traffic control and barriers as per TMP for each work period -Concrete saw for road opening -Excavation (open trench) to required depth and placement of bedding material -Excavation for underbore pits as below	1 x 5t Excavator 1 x Road Saw 1 x 8t Tipper 2 x Traffic control vehicles Up to 10-20 workers may be on site
Pipelaying and backfill	-Pipes will be hand lifted or placed with excavator -Pipe joining and fixtures to be installed -Length of open trench to be minimised and backfilled on completion of section	1 x 5t Excavator 1 x Franna crane (pipe delivery) 1 x Delivery trucks 2 x Traffic control vehicles Up to 10-20 workers may be on site
Underbore	-Excavation to open entry and exit pits and shoring -Underbore activities	As above Plus 1x underbore and slurry containment system
Testing and commissioning (April 2025 1 week)	In conjunction with Sydney Water	2 x Sydney Water truck 2 x Traffic control vehicles Up to 10 workers may be on site
Final connection and cutover (June 2025 – 2 days)	In conjunction with Sydney Water	2 x Sydney Water truck 2 x Traffic control vehicles Up to 10 workers may be on site

The existing site facilities at Orchard Hills will be used to service the construction of the gravity main and no other ancillary facilities are proposed.

Whenever possible work would be carried out during standard work hours as set out in Condition E38 of the Conditions of Approval.

- (a) 7:00am to 6:00pm Mondays to Fridays, inclusive;
- (b) 8:00am to 1:00pm Saturdays; and
- (c) at no time on Sundays or public holidays

Out of hours works (OOHW) are not anticipated to be required for these works. However, if road occupancy licence (ROL) conditions require OOHW Parklife Metro will prioritise use of evening works hours as far as possible within the parameters of the ROL conditions.

- OOH Evening 6.00pm to 10.00pm Monday to Saturday and 6.00pm to 10.00pm Sunday
- OOH Night from 10.00pm to 7.00am Monday to Friday and from 10.00pm to 8.00am Saturday, Sunday and public holidays

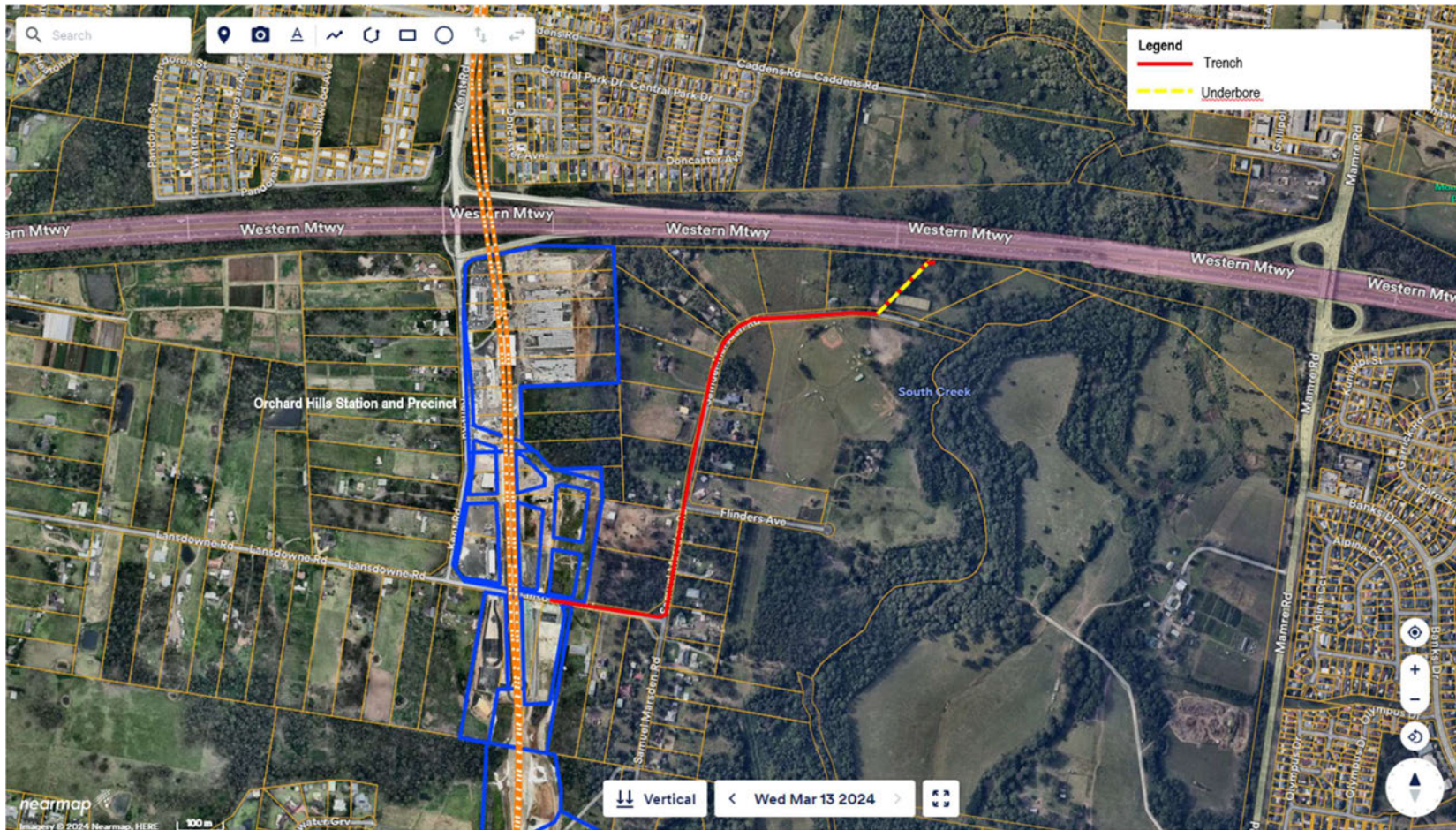


Figure 1 Location of works area and construction method

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2. Consistency with Conditions of Approval

The following table outlines whether the proposed changes would be consistent with the relevant Conditions of Approval.

Table 2 Comparison of the proposal with relevant elements of the Approved Project

Relevant elements of the Approved Project	Proposed Change
<p>Section 8.11.5 of the EIS allows for additional utility works that are required outside of the construction footprint for the project provided the works are consistent with the following performance criteria:</p> <ul style="list-style-type: none"> the works connect to the construction footprint or to a point adjacent to the construction footprint the works have no direct impact on heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts assessed in the Environmental Impact Statement <p>The works can be carried out and managed consistent with the performance outcomes identified in Chapter 27 (Synthesis) or as revised</p>	<p>Construction footprint</p> <p>The works connect to the construction footprint from Orchard Hills Station as shown in Figure 1.</p>
	<p>Non-Aboriginal heritage</p> <p>A review of the EIS and submissions report and search of the State Heritage Register (SHR), Section 170 Heritage and Conservation Registers and Penrith Local Environmental Plan on 12 December 2023 identified one non-Aboriginal heritage item in the vicinity of the works.</p> <ul style="list-style-type: none"> Mamre homestead is a state significant item listed on the State Heritage Register (item 00264) <p>Mamre is located approximately 1 km east of the nearest works. No impacts would occur due to the distance between the proposed works and the heritage item.</p> <p>The Unexpected Heritage Finds Procedure would be implemented during work.</p>
	<p>Aboriginal heritage</p> <p>Information reviewed from the Sydney Metro – Western Sydney Airport Revised Aboriginal Cultural Heritage Assessment Report (M2A, April 2021) identified four sites in the area south of and adjacent to the M4 Motorway. All sites are listed as destroyed.</p> <ul style="list-style-type: none"> 45-5-3565- Artefact [Destroyed] 45-5-1071 Artefact [Destroyed] South Creek 2. 45-5-4431 – Artefact [Destroyed] 45-5-4430 - Artefact [Destroyed]

A search of the Aboriginal Heritage Information Management System (AHIMS) on 31 October 2023 (see Appendix B) identified no new sites in the vicinity of the works.

Two Aboriginal heritage impact permits (AHIP) have been identified in the vicinity of the work area.

AHIP No. C0000637 – issued for the Werrington Arterial Road Project, which included upgrades to Kent Road and Gipps Street and the M4 Motorway at Claremont Meadows.

AHIP NO. C0002113 – Issued for management of the M4 Motorway between Lapstone and Parramatta.

The connection point of the proposed new sewer main to the existing Sydney Water submain occurs in an area adjacent to, but not within, the AHIP boundaries above. Figure A2 in Appendix A shows the location of the AHIPs.

As the sewer main route falls outside the area investigated during the SM-WSA EIS and Submissions Report investigations an additional Aboriginal heritage due diligence investigation was completed along the sewer main route. The assessment was undertaken by Unearthed Archaeology and Heritage in accordance with the *Due diligence code of practice for the protection of Aboriginal objects in NSW* (DECCW 2010) and *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment & Heritage 2011).

The assessment included background research into the landscape, environmental and archaeological context of the study area and included a site inspection on foot along the entire proposed route. The assessment identified that the sewer main works, based on local predictive models, are located in an area of potential archaeological sensitivity due to proximity to, and location between, two second order creeks and evidence of a water hole in Lot 19 DP 238495, observed on 1965 aerial photography.

However, the whole of the road reserve of both Lansdowne and Samuel Marsden roads was observed to be highly disturbed by drainage, services and road construction. Significant disturbance in the form construction of Sydney Water infrastructure in the early 1970's (sewer sub-main), through the property at the end of Samuel Marsden Road (Lot 19 DP238495) was confirmed through the review of Sydney Water 'as-built' drawings. No evidence of a waterhole was observed in 1975 aerial photography, and it is considered likely Sydney Water construction in 1970 and 1971 included drainage of this area.

The assessment concluded it is considered highly unlikely that in situ Aboriginal archaeological deposits remain within the study area due to the extensive disturbance caused by the construction of Sydney Water infrastructure, drainage, roads, and above and underground services. It is not expected that the proposed works will impact on any Aboriginal objects or sites. No further archaeological investigation in respect of Aboriginal archaeology is therefore proposed.

	<p>The Aboriginal Due Diligence Assessment report (Unearthed Archaeology 2024) is included in Appendix B.</p> <p>The Unexpected Heritage Finds Procedure would be implemented during work.</p> <p>Biodiversity</p> <p>Areas of vegetation along the route were mapped by Biosis (2018) as part of the Western Sydney Strategic Assessment for the Cumberland Plain Conservation Plan (CPCP) as threatened ecological communities under the <i>Biodiversity Conservation Act 2016</i> (BC Act). Both Shale Gravel Transition Forest in the Sydney Basin Bioregion and River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions have been mapped along western road verge adjacent to the proposed sewer main alignment. Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion has also been mapped on the eastern road verge. Vegetation types along Lansdowne and Samuel Marsden roads are shown in Figure A3.</p> <p>The CPCP nominates 'Avoided land' which represent areas of high biodiversity value to be protected as part of future development. Lots 961 DP712220 and 962 DP712220, containing Shale Gravel Transition Forest in the Sydney Basin Bioregion, are mapped as Avoided land as shown in Figure A4.</p> <p>Samuel Marsden Road reserve is assessed as "Certified – urban capable land" while the property owned by Department of Planning, Housing and Infrastructure is "Certified – major transport corridor". The construction footprint for this Sydney Metro WSA project is mapped as 'Excluded Land', being assessed separately within the SM-WSA EIS and Submissions Report.</p> <p>The project team have confirmed that clearing of vegetation would not be required as works will be undertaken in the carriage way of the road, the cleared road reserve area and through use of trenchless construction techniques as required. As no vegetation removal is required the works are consistent with the direct impacts described in the EIS.</p> <p>The proposed works may increase noise, dust, erosion and sedimentation, and cause the introduction of weeds. This is consistent with the indirect impacts described in the EIS and can be managed with existing measures.</p> <p>No-go zones will be established as required to prevent inadvertent damage to sensitive vegetation. These will be indicated on the ECM and communicated to the workforce during site inductions and toolbox talks.</p>
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	<p>Performance Outcomes</p> <p>The works can be managed consistent with relevant performance outcomes (POs) as revised in the SMWSA Submissions Report including:</p> <ul style="list-style-type: none"> • Safe and efficient routes are provided for pedestrians, cyclists and road users at/near construction sites. • Safe access to properties and businesses is maintained during construction, unless alternatives are agreed with property owners and businesses. • Construction noise and vibration impacts on local communities (including airborne noise and ground borne noise and vibration) will be managed in accordance with the Noise and Vibration Management Sub-plan - SMWSASSM-PLD-1NL-PC-PLN-000024, (which includes reference to the Construction Noise and Vibration Standard and the Interim Construction Noise Guideline) and the Project EPL conditions. • The work will avoid impacts on threatened flora and fauna species, and ecological communities listed under the <i>Biodiversity Conservation Act 2016</i> (NSW) and <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cth).
<p>SSI CoA E2 – Minimising clearing of native vegetation</p>	<p>The project team have confirmed that clearing of vegetation would not be required as works will be undertaken in the carriage way of the road, the cleared road reserve area and trenchless construction techniques will be used as required.</p>
<p>SSI CoA E36 – The Unexpected Heritage Finds and Human Remains Procedure must be implemented</p>	<p>The proposed works will be subject to the Sydney Metro Unexpected Heritage Finds and Human Remains Procedure.</p>
<p>SSI CoA E41(c)(i) By Approval, including Where different construction hours are permitted or required under an EPL in force in respect of the CSSI</p>	<p>Any OOHW required will be undertaken in accordance with the approved Parklife Metro Noise and Vibration Management Sub-plan - SMWSASSM-PLD-1NL-PC-PLN-000024. The works will be subject to the SSTOM package EPL no. 21807, and will be approved as per the requirements of this EPL, which permit out of hours works in accordance with Condition E41(c)(i).</p> <p>In accordance with Condition E47, a DNVIS would be prepared where works are required to be undertaken outside of standard construction hours and result in exceedances of the applicable NML or exceed the vibration criteria, or where receivers are highly noise affected. A DNVIS will be prepared for these works if OOH works are required as the preliminary noise assessment indicated exceedances of the evening and nighttime NMLs. The preliminary noise assessment is included in Appendix C.</p>

<p>SSI CoA E64 – The CSSI must be constructed and operated with the objective of minimising light spill to surrounding properties. All lighting associated with the CSSI must be consistent with the requirements of:</p> <ul style="list-style-type: none"> ASINZS 4282:2019 Control of the obtrusive effects of outdoor lighting, relevant Australian Standards in the series ASINZS 1158 - Lighting for Roads and Public Spaces; NASF Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports; and NASF Guideline C: Managing the risk of wildlife strikes in the vicinity of airports. <p>Mitigation measures must be provided to manage residual night lighting impacts to protect properties adjoining or adjacent to the CSSI, in consultation with affected landowners.</p>	<p>Any night lighting required during OOHW (if applicable) will be managed in accordance with the appropriate guidelines to minimise light spill and impacts to sensitive receivers as outlined in the approved Visual Amenity Management Sub-plan SMWSASSM-PLD-1NL-PC-PLN-000027.</p>
<p>SSI CoA E99 – The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction.</p>	<p>The Contamination and Asbestos Unexpected Find Procedure has been prepared as part of the approved Soil and Water Management Sub-plan SMWSASSM-PLD-1NL-PC-PLN-0000. The Procedure will be implemented throughout construction.</p>
<p>SSI CoA E105 – Local roads proposed to be used by Heavy Vehicles to directly access ancillary facilities / construction sites that are not identified in the documents listed in Condition A1 must be approved by the Planning Secretary and be included in the CTMP.</p>	<p>Samuel Marsden Road is a local road managed by Penrith City Council. The road has not been identified in the WSA-EIS or Submissions Report as described in Condition A1.</p> <p>A Heavy Vehicle Local Road (HVLr) report will be prepared for approval by the Planning Secretary prior to works involving heavy vehicles commencing.</p> <p>A Construction Traffic Management Plan will also be prepared for this work area prior to works commencing.</p>
<p>SSI CoA E110 – Access to all utilities and properties must be maintained during works, unless otherwise agreed with the relevant utility owner, landowner or occupier.</p>	<p>The design has been determined in accordance with Sydney Water requirements through an approved Water Service Coordinator. Consultation with the Department of Planning, Housing and Infrastructure (and Penrith City Council as lessee) has been managed in accordance with Sydney Water Entry onto third party property guidelines and following the Permission to Enter processes. Parklife Metro community consultation team will consult with residential landholders along the sewer main route in accordance with the approved Community Communications Strategy – Delivery SMWSASSM-PLD-1NL-PC-PLN-000065.</p>
<p>SSI CoA E120 – Minimising impacts to utilities infrastructure and disruptions of services.</p>	<p>The design has been finalised in accordance with Sydney Water requirements through an approved Water Service Coordinator. Construction works with the potential to cause disruption to supply may occur during the testing and commissioning phase and during final cutover. These works will be undertaken in conjunction with specialised Sydney Water crews. Parklife Metro will work with Sydney Water during these phases and implement standard Sydney Water process and procedures to minimise the potential for any unplanned service disruption.</p>

SSI CoA E128 – Erosion and sediment controls must be implemented and maintained consistent with the Blue Book	A work-specific Erosion and Sediment Control Plans (ESCPs) will be developed for the work in accordance with the approved Soil and Water Management Sub-plan - SMWSASSM-PLD-1NL-PC-PLN-000020. All ESCPs are prepared and implemented in a manner consistent with currently accepted Best Management Practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004 (Blue Book))
REMM AH9 – Works within the bounds of existing Aboriginal Heritage Impact Permit areas should be undertaken in accordance with the conditions of those permits and with permission from the relevant Aboriginal Heritage Impact Permit holder. Works undertaken within the revised boundaries on Defence Establishment Orchard Hills (Commonwealth land) should be undertaken in accordance with the Defence Establishment Orchard Hills Heritage Management Plan.	As described above the work is adjacent to two AHIP areas. As the proposed sewer main works are outside the bounds of the AHIP areas no further actions are required under REMM AH9.
EPBC 2020/8687	Not considered further as the works would not impact protected matters or extend into or affect Commonwealth Land.

3. Environmental review

The following table provides a risk review of the potential environmental impacts of the proposed works.

Table 3 Environmental review

Environmental review	Yes / No	Description of impacts (including consideration of safeguards required by the Approved Project)
Is the proposal to take place outside of the construction footprint of the project	Yes	The sewer main will connect the Orchard Hill station area to the existing Sydney Water DN1350 South Creek submain. The final design of the gravity main including the connection point to the South Creek submain was determined by Sydney Water and is documented in the NOR. The EIS considers and provides an assessment pathway for such utility works. Impacts would be consistent with those assessed in the EIS, are anticipated to be localised, and can be managed appropriately by the existing conditions of approval, revised environmental mitigation measures (REMMs) and performance outcomes
Is the location of works within the existing EPL premise boundary	No	EPL no 21807 has been issued to Webuild S.P.A for the Sydney Metro Western Sydney Airport - Stations, Systems, Trains, Operations and Maintenance (SSTOM) Package. Prior to the works commencing Parklife Metro will update the premise map boundary to include the work area required for the sewer main construction. The current project premise maps are available to view on the Parklife Metro website https://parklifemetro.com.au/project/ .
Will the works take longer than 2 weeks to complete.	Yes	The construction works will take approximately 7 months to complete commencing July 2024. Where trenching is carried out works will be undertaken in a progressive manner receivers will only be impacted for a portion of the works duration, not the full 7 month construction period. Where

		<p>underbore equipment is located the time at one location will be approximately one month.</p> <p>Potential community impacts will be managed through the consultation and OOHW process. Potential traffic management will be managed through the traffic management process, CTMP and include consultation with the TTLG along with works in accordance with required ROLs.</p>
Does the work require OOHW approval	Yes	OOHW are not anticipated for the works. However, if OOHW are stipulated by ROL conditions or other requirements additional assessment and approval processes would be followed, in accordance with the PLM OOHW Procedure for the project
Will the works impact an EEC or threatened species	No	The clearing of EEC and impacts to threatened species are not required. The ECM will identify areas of biodiversity sensitivity.
Will works impact on native vegetation	No	The clearing of native vegetation is not required.
Will the works impact on habitat trees	No	Clearing habitat trees is not required.
Will clearing of non EECs or ground disturbance be of High / moderate condition vegetation. What is the area of impact	No	No clearing or ground disturbance in areas of high or moderate value vegetation will occur. The majority of the works will be undertaken in the carriage way of the road or the cleared, mown road reserve area. Where required trenchless construction techniques will be used to avoid impacts to vegetation.
Will the works result in medium / high noise or vibration impacts Will noise and vibration impacts on sensitive receivers be greater than that predicted in the EIA	Yes	<p>There are approximately 20 residential properties located along Lansdowne and Samuel Marsden Roads, with the majority of these properties being within 20 to 30m of the road. The proposed works are anticipated to take place during standard construction hours.</p> <p>The construction of the sewer main will require works to be located closer to receivers than those works within the construction footprint assessed in the EIS.</p> <p>A preliminary noise assessment was carried out to determine the likely noise impacts from the works. A basic point to point assessment was carried out on two scenarios</p> <ol style="list-style-type: none"> 1. Concrete saw and excavator 2. Underbore activity + delivery truck

		<p>While the work would exceed the NML during standard construction hours, works are not anticipated to exceed 75dBA (highly noise affected criteria). However, the works would exceed evening and night time NMLs as well as sleep disturbance criteria, and a DNVIS would be required for any OOHW.</p> <p>To ensure appropriate management of noise impacts a DNVIS will be prepared for these works. Mitigation measures included in the DNVIS would be implemented and would include any additional mitigation measures (AMM) where required. Additional mitigation measures that may be implemented are outlined in the Sydney Metro Construction Noise and Vibration Standard.</p> <p>Any OOHW required will be undertaken in accordance with the approved Parklife Metro Noise and Vibration Management Sub-plan - SMWSASSM-PLD-1NL-PC-PLN-000024. This includes the OOHW permit process which addresses the requirements of Condition E42. In accordance with Condition E47, a DNVIS would be prepared where works are required to be undertaken outside of standard construction hours and result in exceedances of the applicable NML or exceed the vibration criteria.</p>
Will the works result in medium/high air quality impacts	No	<p>Possible air quality impacts include dust and particulates generated from plant and equipment as well as excavation activities. With the implementation of mitigation measures included in the Air Quality Management Sub-Plan SMWSASSM-PLD-1NL-PC-PLN-000028 impacts would be managed.</p>
Will the activity be located adjacent to or in close proximity to sensitive receivers	Yes	<p>The works would be located adjacent to residential properties along Samuel Marsden Road and Lansdowne Road. Samuel Marsden Reserve is accessed from the north-east end of the Samuel Marsden Road. Four baseball diamonds are in use within the reserve by local baseball clubs. Access to the reserve would not be impacted by the work.</p> <p>Sensitive receivers would be notified of the upcoming works. Further community notification and mitigation measures would also be completed if OOHW are required.</p>
Would there be additional impact from what was predicted in the EIS on an Aboriginal / Historic heritage site as a result of the works	No	<p>No Aboriginal or non-Aboriginal heritage sites are likely to be impacted due to the distance between the proposed works and existing heritage sites. The Aboriginal Heritage Due Diligence Assessment is included in Attachment B. Heritage areas will be identified on the ECM.</p> <p>The Unexpected Heritage Finds Procedure will be implemented for the works.</p> <p>Prior to works commencing, a toolbox will be delivered to the workforce to communicate the requirements of the Unexpected Finds Procedure as well as the location of the identified AHIMS sites.</p>
Are works within 10m of a watercourse	No	<p>The proposed works are not within 10m of a watercourse. Erosion and Sediment Control Plans (ESCPs) will be developed for all active worksites in accordance with the approved Soil and Water Management Sub-plan - SMWSASSM-PLD-1NL-PC-PLN-000020 which includes. The road surface will be re-instated following the completion of the proposed works.</p>
Are works in an area of known contamination	No	<p>A search of the contaminated sites register https://app.epa.nsw.gov.au/prclmapp/searchregister.aspx</p>

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		<p>did not identify any sites listed along the sewer main route. The rural history of the area may indicate the presence of potential contaminated areas from activities such as historical use and storage of herbicides and pesticides or hazardous building materials.</p> <p>As the works are predominately in the road reserve the likelihood of encountering contaminated materials is considered low.</p> <p>The Contamination and Asbestos Unexpected Finds Procedure will be implemented during the construction works as outlined in the approved Soil and Water Management Sub-plan - SMWSASSM-PLD-1NL-PC-PLN-000020.</p>
Will the works result in temporary or long-term traffic impacts	Yes	<p>Works will be within the public road reserve.</p> <p>The primary traffic impact will be maintenance of access to residential properties. Temporary traffic impacts are expected to be caused by lane disruption to create safe work spaces within the active road lanes and road reserve area.</p> <p>There are no anticipated long-term traffic impacts and access to properties would be maintained at all times.</p> <p>Temporary impacts would be localised and can be managed appropriately by the existing conditions of approval, REMMs and performance outcomes.</p> <p>Appropriate traffic management planning will include consultation with the TTLG and through the road occupancy licence process.</p> <p>An updated Traffic Management Plan will be prepared for the work and will include consideration of heavy vehicle use on Samuel Marsden Road as required by Condition E105. Consultation with affected residents will be undertaken prior to works commencing.</p>
Will the works result in visual impacts to sensitive receivers	Yes	<p>Temporary visual impacts are expected for those nearest residential receivers along Lansdowne and Samuel Marsden roads (some within 20m). Where underbore entry and exit pits are required construction infrastructure will be at the work location for 1 month.</p> <p>On completion of the work all permanent works will be underground. Maintenance hole lids will be visible at grade and generally within the existing roadway or road reserve. No permanent visual impact is expected.</p>
Will the works involve significant earthworks	No	<p>The proposed works would have a small disturbance area limited to progressive trenching, maintenance hole installation as well as excavation for underbore entry and exit pits.</p>

4. Recommendation

Based on the above assessment, and with reference to the SM-WSA EIS and Submissions Report, including the conditions of approval and associated CEMP and plans, it is recommended that:

✓	The proposed design/construction change is consistent with the Approved Project SM-WSA EIS and Submissions Report, including the conditions of approval, has negligible impacts on the community and environment and no further assessment is required.
	The proposed design/construction change is likely to be consistent with the Approved Project SM-WSA EIS and Submissions Report, however more than a negligible impact on the community and environment may result and further assessment in the form of a Planning Approval Consistency Assessment form is required to be completed and submitted to the Planning team for the proposed design/ construction change.
	The proposed design/ construction change is not substantially the same as the Approved Project and is considered a radical transformation. A new planning pathway should be considered.

5. Certification

The above information provides a true and fair review of the proposed works.

[Redacted signature]

[Redacted signature]

[Redacted signature]

Position: Parklife Metro D&C Environment Manager

6. Endorsement

I have reviewed the above review and provide the following endorsement:

✓	The proposed design/construction change is consistent with the Approved Project SM-WSA EIS and Submissions Report, has negligible impacts on the community and environment and no further assessment or modification of the planning approval is required.
	The proposed design/construction change is likely to be consistent with the Approved Project SM-WSA EIS and Submissions Report, however more than negligible impacts are expected on the community and environment and further assessment is required.
	The proposed design/construction change constitutes a project modification and requires further assessment and approval.

This endorsement is conditional on the following:

1. All works will be carried out in accordance with the Approved Project SM-WSA EIS and Submissions Report and the Project Conditions of Approval.
2. All works will be carried out in accordance with the approved Construction Environmental Management Plan and any relevant sub plans.

Signed:	[Redacted Signature]
Endorsed by:	[Redacted Name] A/Senior Manager Planning Approvals
Date:	29.04.2024

Appendix A – Figures

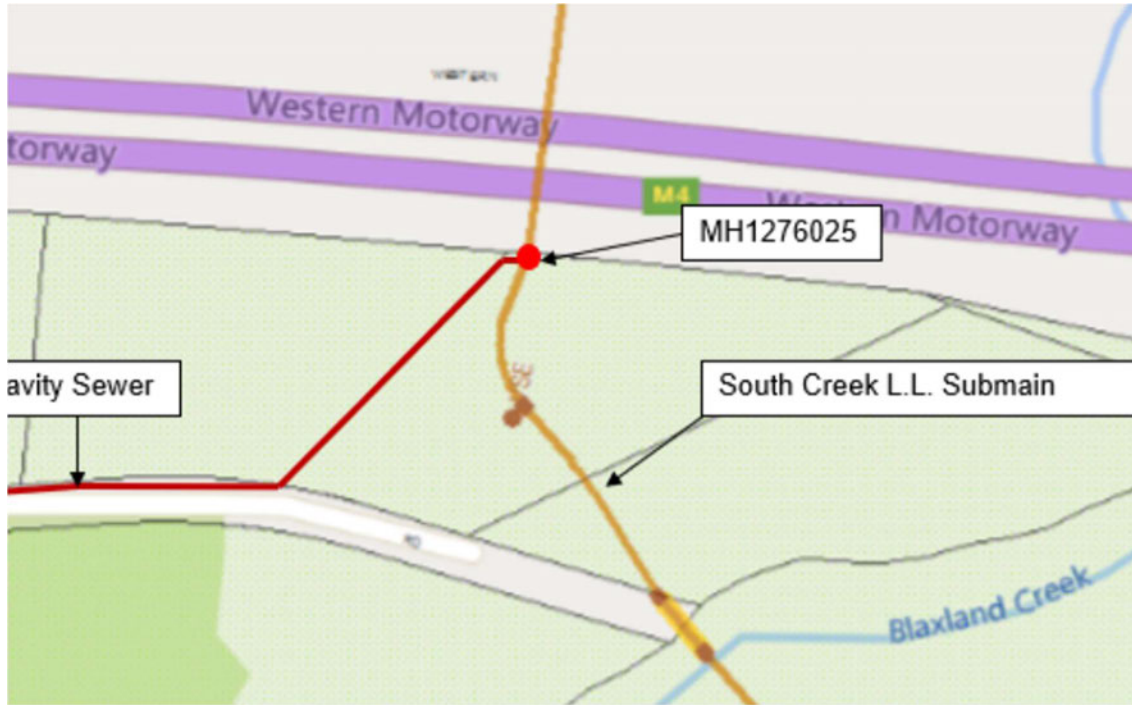


Figure A1 Connection to existing Sydney Water sewer submain

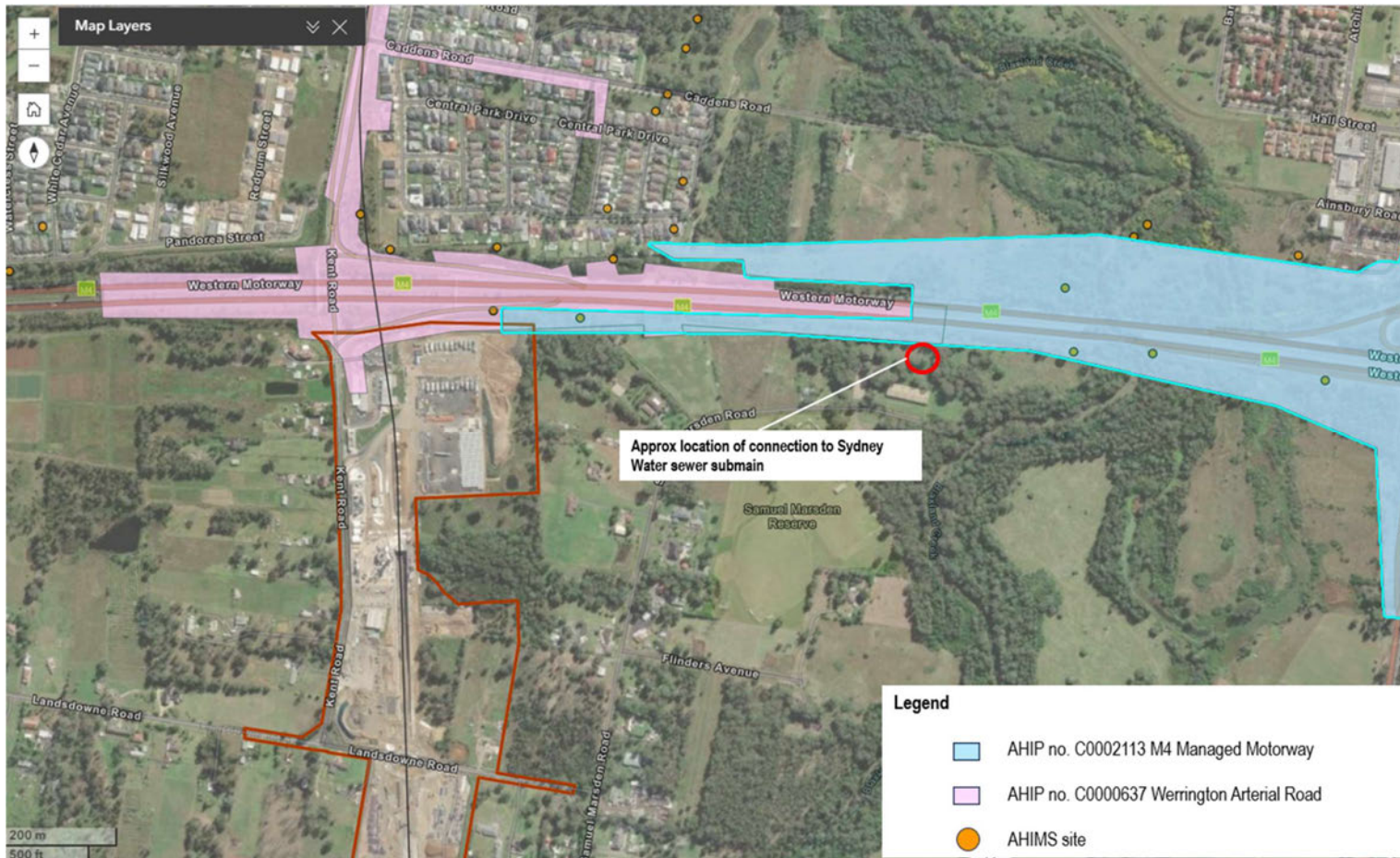


Figure A2 Boundaries of existing AHIPs



Figure A3 Vegetation communities along the sewer main route

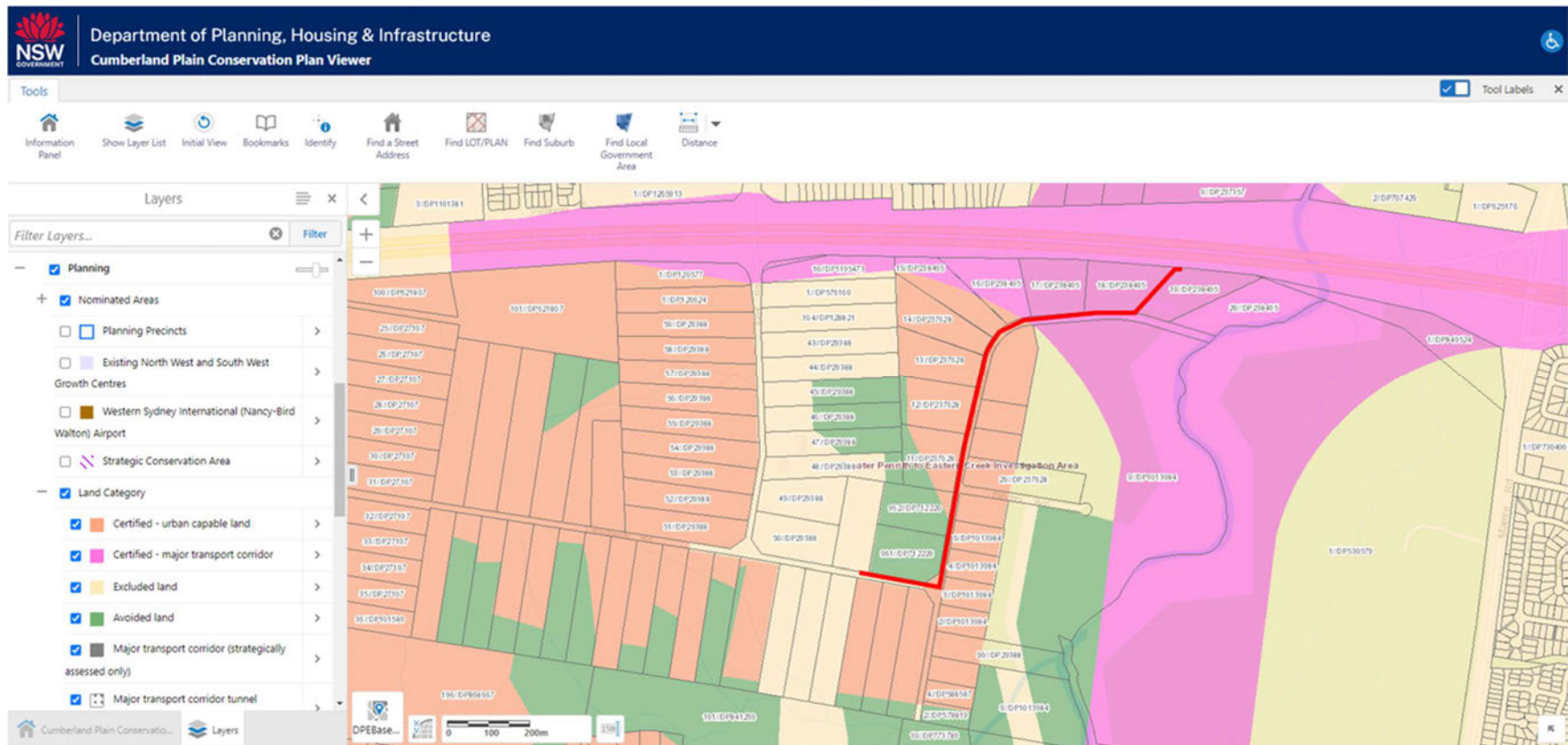


Figure A4 Cumberland Plain Conservation Management Plan land categories

Appendix B – Aboriginal Heritage Due Diligence Assessment

Unearthed

Archaeology & Heritage



Samuel Marsden Road Sewer Main, Orchard Hills Aboriginal Due Diligence Assessment

Prepared by:	██████████
Report to:	Parklife
LGA:	Penrith City Council
Date:	April 2024
Version:	D.2024.1108
AHIMS No.:	

Version:	Project Number: UA/1108.PL	
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D.2024	Author(s):	[REDACTED]
	Date:	23 rd April 2024
	Status:	Final

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Executive Summary

Parklife proposes the construction of a new gravity sewer main between the Orchard Hills Metro Station site and the existing Sydney Water DN1350 South Creek submain. As such, Unearthed Archaeology & Heritage were commissioned by Parklife to undertake this Aboriginal due diligence assessment. This Aboriginal due diligence assessment has been prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment & Heritage 2011) and the *Due diligence code of practice for the protection of Aboriginal Objects in NSW* (DECCW 2010).

The proposed gravity sewer main will be constructed in the road reserve from the Orchard Hills Metro Station along Lansdowne Road, up Samuel Marsden Road and intersect with the existing Sydney Water DN1350 South Creek submain on the northern boundary of the property at the end of Samuel Marsden Road. Proposed construction is via open trenching and underboring where required, e.g. where space in the road verge is limited. Maintenance holes are proposed along the route with a maximum interval of approximately 250m.

The predictive model indicates that archaeological deposits could be expected within the study area due to the location of Lot 19 DP238495 adjacent to Blaxland Creek and the presence of a water hole within the property on the 1965 aerial photograph which indicates that this could have been a resource or camping area for the Aboriginal people of the area. However, the whole of the road reserve of both Lansdowne and Samuel Marsden Roads is highly disturbed by drainage, services and road construction. The property at the end of Samuel Marsden Road (Lot 19 DP238495) has been subjected to significant disturbance in the form of the construction of the Sydney Water infrastructure in the early 1970s. However, it appears to have been utilised as cleared farmland and remained undeveloped until the 1990s when the existing farm building was constructed. Therefore, it is considered highly unlikely that *in situ* Aboriginal archaeological deposits remain within the study area due to the extensive disturbance caused by the construction of Sydney Water infrastructure, drainage, roads, and above and underground services. It is not expected that the proposed works will impact on any Aboriginal objects or sites.

Therefore, it is recommended that:

1. No Aboriginal objects were recorded during the site inspection and it is not expected that any sites or subsurface deposits will be harmed during the proposed works. There is no objection to the construction of the proposed sewer main on Aboriginal archaeological grounds and no further archaeological investigation is required.
2. If during the proposed works any unexpected Aboriginal objects, or any other evidence of Aboriginal occupation is uncovered, all work must cease in the vicinity of the suspected Aboriginal objects or evidence of occupation, and further advice should be sought from a qualified archaeologist.
3. If, in the unlikely event, any skeletal material is uncovered during the proposed works, all work must cease and the following steps be immediately undertaken:
 - a) You must not further disturb or move these remains.
 - b) You must immediately cease all work at the particular location.
 - c) You must notify NSW Police.
 - d) You must notify Heritage NSW's Environment Line on 131 555 as soon as practicable and provide available details of the remains and their location.
 - e) You must not recommence any work at the particular location unless authorised in writing by Heritage NSW.
 - f) Any Aboriginal skeletal remains must be recorded and reported under the direct supervision of a specialist physical anthropologist.

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1.0 Background Information

1.1 Introduction

Parklife proposes the construction of a new gravity sewer main between the Orchard Hills Metro Station site and the existing Sydney Water DN1350 South Creek submain.

As such, Unearthed Archaeology & Heritage were commissioned by Parklife to undertake this Aboriginal due diligence assessment. This Aboriginal due diligence assessment has been prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment & Heritage 2011) and the *Due diligence code of practice for the protection of Aboriginal Objects in NSW* (DECCW 2010).

1.2 Study Area Location

The proposed new gravity sewer main will run between the new Orchard Hills Metro Station, located on the eastern side of Kent Road, north of Lansdowne Road, to the existing Sydney Water DN1350 South Creek submain on the northern boundary of Lot 19 DP238495. The proposed gravity sewer main would run along the northern verge of Lansdowne Road and, along the western and northern verge of Samuel Marsden Road.

The study area is located within the Penrith City Council Local Government Area (LGA), approximately 50km to the west of the Sydney Central Business District (CBD). Figure 1 below shows the location of Orchard Hills. Figure 2 shows the location of the study area on the NSW Map. Figure 3 shows the location of the study area on the aerial photograph.

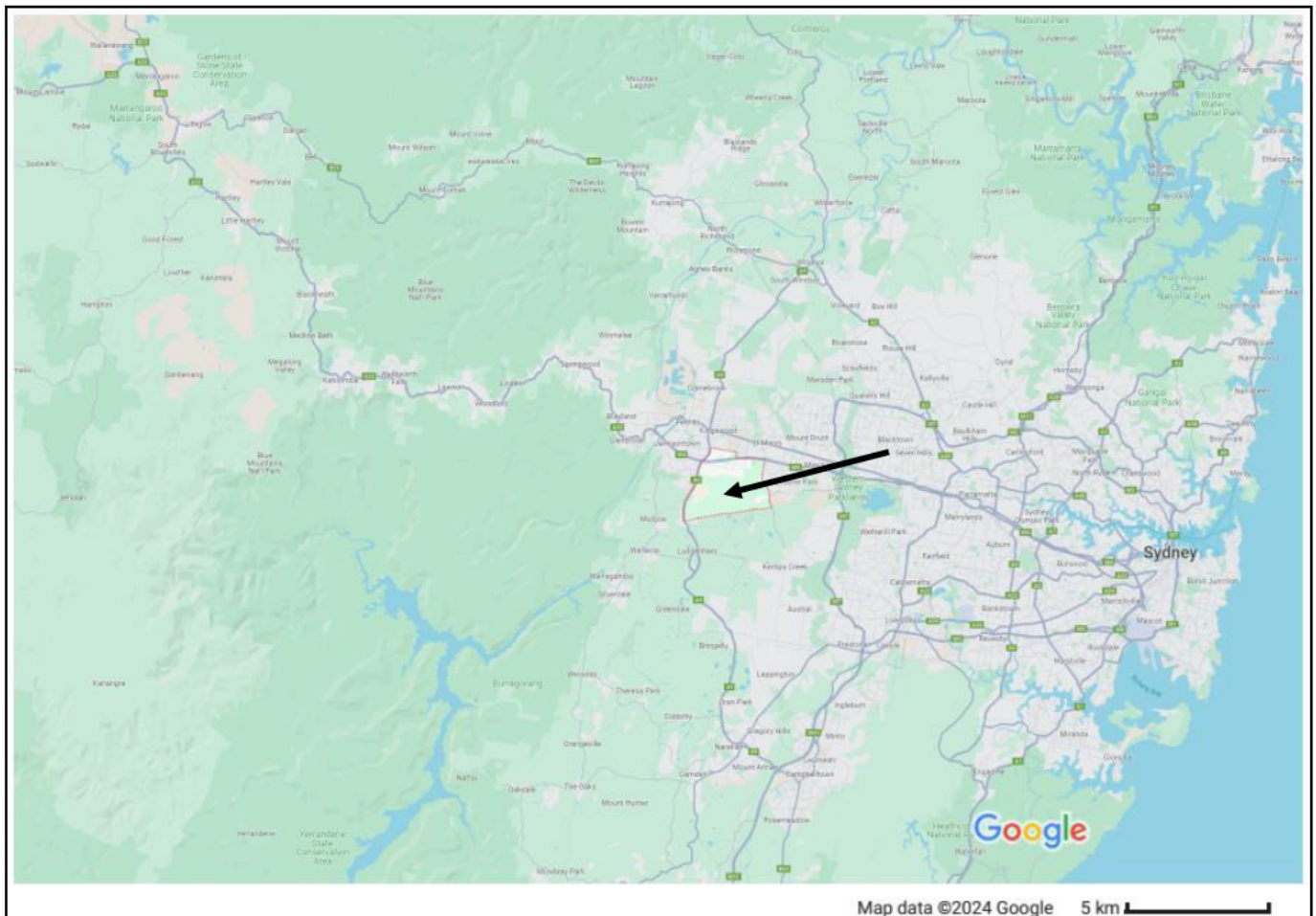
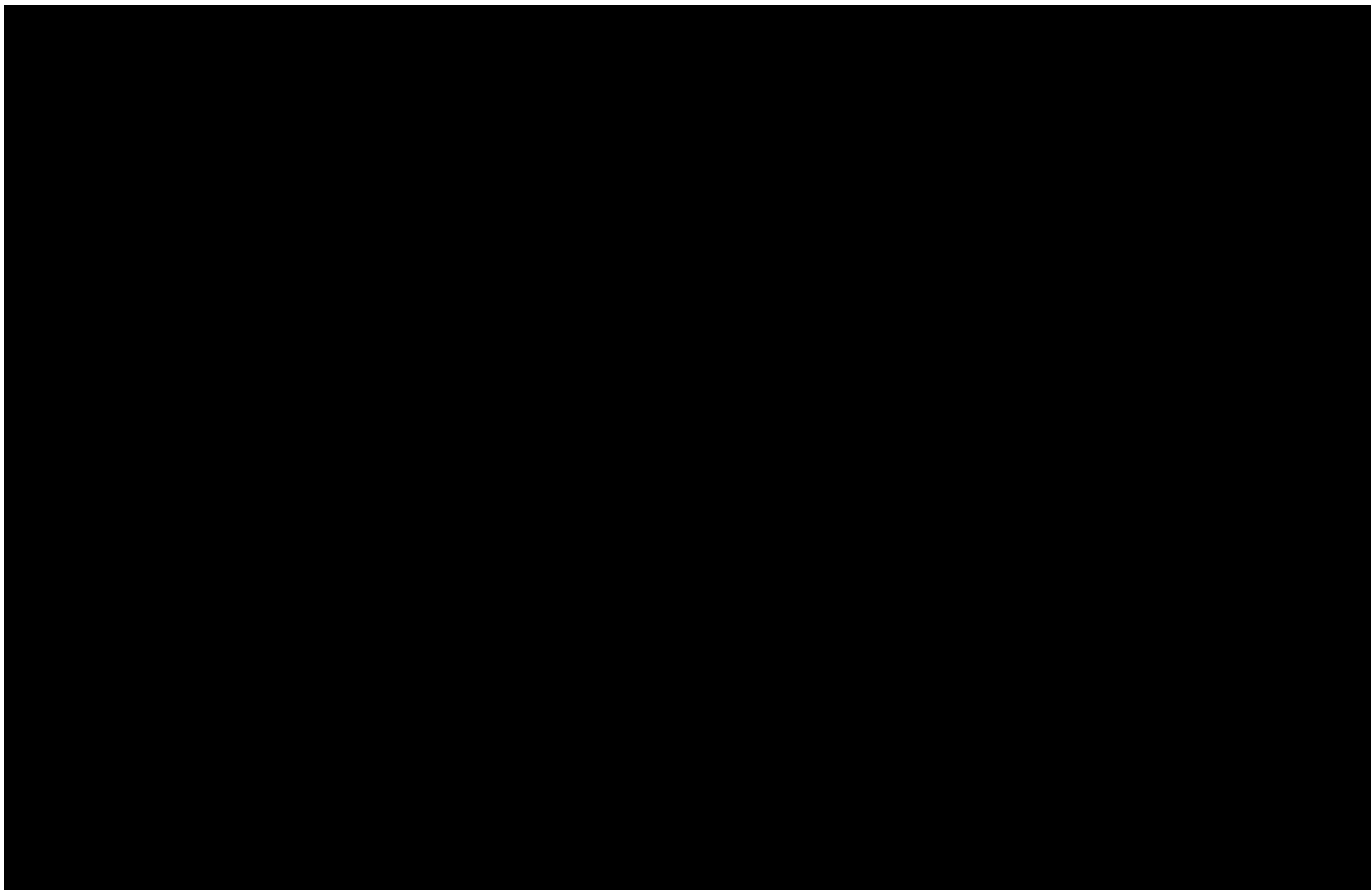
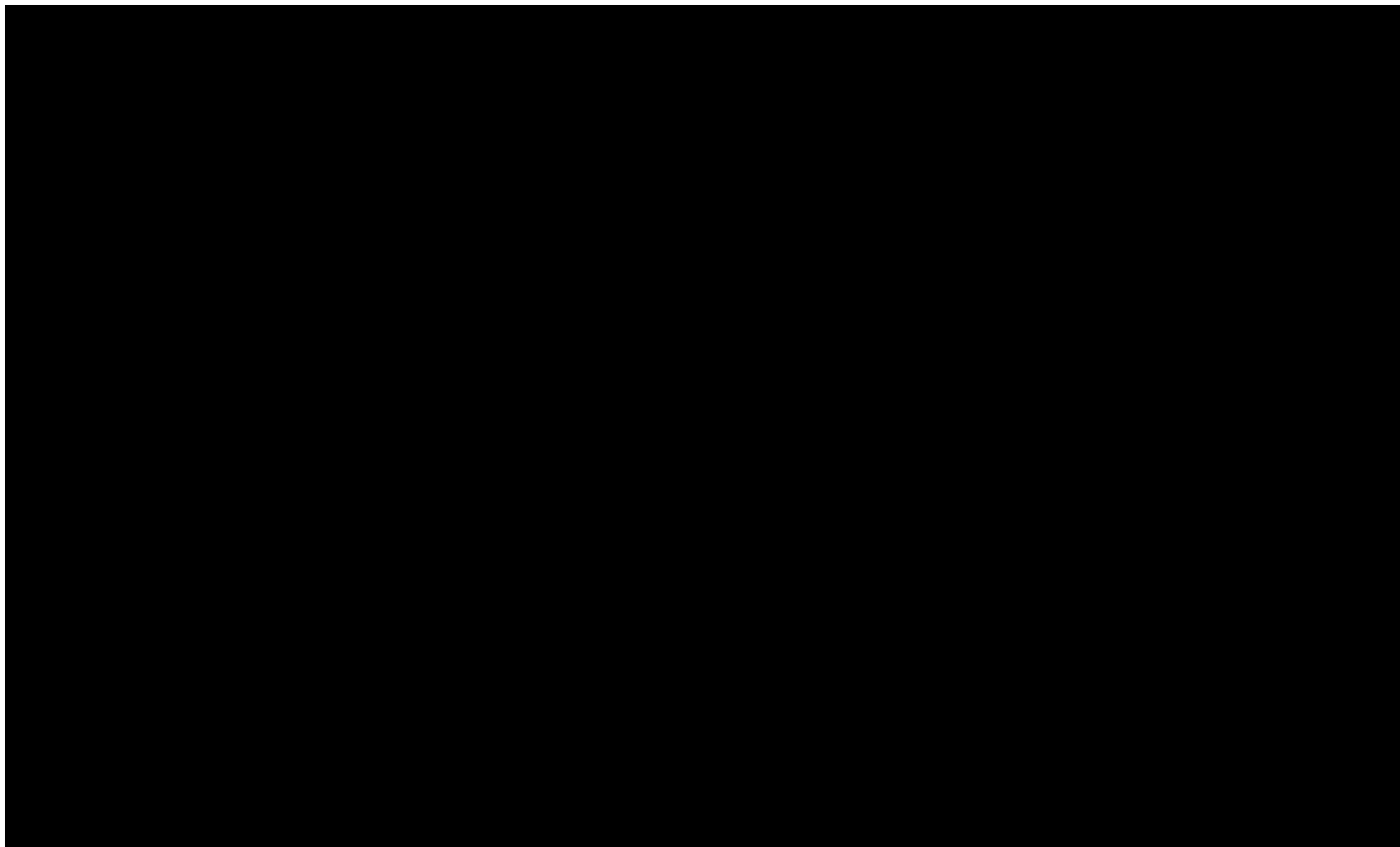


Figure 1: Showing the location of Orchard Hills outlined in red and indicated by the black arrow (map courtesy of Google Maps).



1.3 Proposed Works

The proposed works include the construction of a new approximately 1400m long sewer main predominantly in the road verge. Proposed construction is via open trenching and underboring where required, e.g. where space in the road verge is limited. Maintenance holes are proposed along the route with a maximum interval of approximately 250m.

Figure 4 below shows the proposed route of the sewer main.

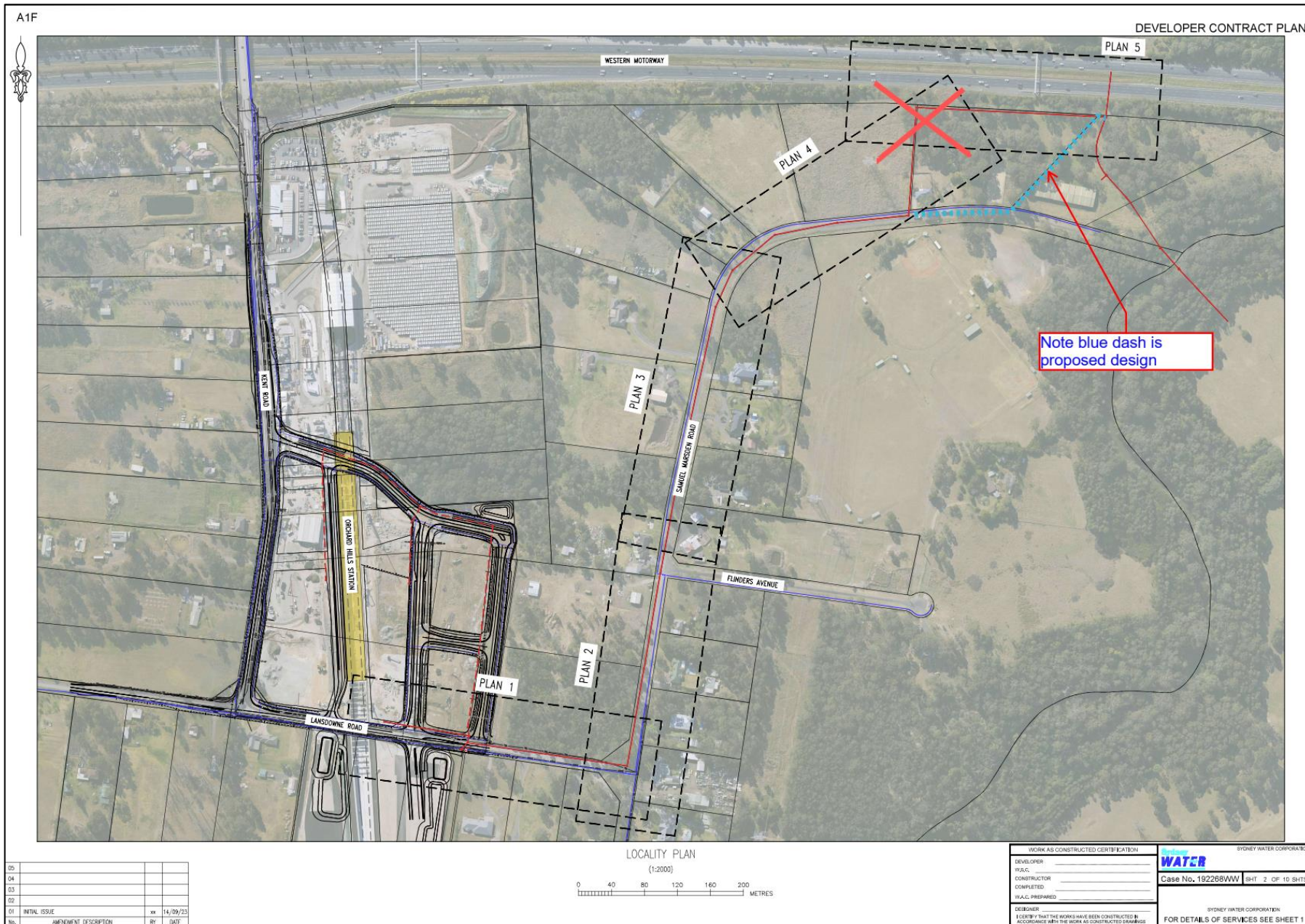


Figure 4: Showing the proposed route of the gravity sewer main indicated by the solid red line and the dashed blue line.

2.0 Landscape and Environmental Context

2.1 Topography

The study area is located within the central portion of the Sydney Basin. The Sydney Basin is a geological basin of the Permian-Triassic era that covers an area of 64,000km² on the central eastern coast of Australia (Stening 2018:6). The Sydney Basin is comprised of sandstone and shales which have been subjected to erosion, creating a landscape of steep sandstone cliffs and escarpments and plateaus over areas of shale (Herbert 1980:21).

Orchard Hills is located within the southern edge of the Cumberland Plain, the low lying gently undulating plain which covers approximately 2750km² and extends from Windsor in the northwest to Picton in the south, the Nepean-Hawkesbury River in the west, to the headwaters of the Georges and Parramatta Rivers in the east and to the Hornsby Plateau in the north (Stening 2018:6).

The present study area is the relatively flat road reserve in a semi rural setting located between Blaxland Creek; which is located approximately 160m to the east of where the proposed gravity sewer main connects into the existing Sydney Water DN1350 South Creek submain; and Claremont Creek; which is located approximately 200m north of the Orchard Hills Metro Station.

Figure 5 below shows the study area on the topographic map.

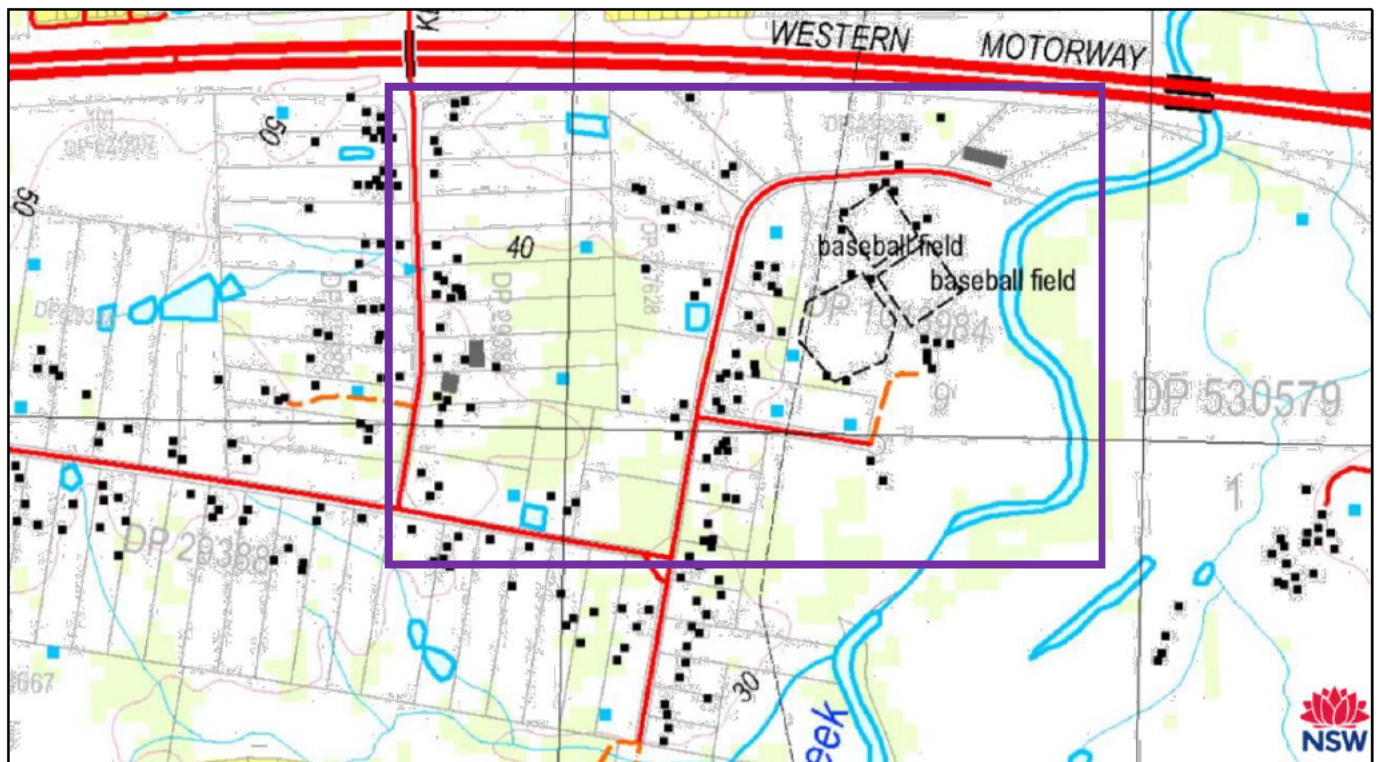


Figure 5: Showing the approximate location of the study area on the topographic map indicated by the purple rectangle (map courtesy of Six Maps).

2.2 Stream Order Modelling

Stream order can be used to facilitate a predictive model of Aboriginal land use patterns. A creek or small tributary that generally does not have any water flowing into it, but feeds into a larger stream is classified as a first order stream. A first order stream can have intermittent flow. When two first order streams join, it creates a second order stream, and the joining of two second order streams creates a third order stream and so forth (Strahler 1957).

McDonald and Mitchell (1994) developed a predictive model within the Cumberland Plain which demonstrates that stream order can be used to predict areas of archaeological potential. Their hypothesis is that in order to allow permanent stream flow or to allow the formation of waterholes with extended longevity over months and years, it is necessary to have a threshold catchment area. The critical point at where the necessary conditions are met is at the junction of two second or third order streams. Locations such as these areas likely to contain larger, more complex sites with higher densities of artefacts, whilst locations within 100 metres of second and third order streams are likely to contain large sites (Stening 2016: 8).

The study area is located between Blaxland Creek and Claremont Creek, both second order streams. As the study area is located between two second order streams, it could be predicted to contain archaeological potential.

2.3 Geology

The Cumberland Plain generally overlies the Wianamatta Group of Shales. The geology of the study area is comprised of the Bringelly Shale sub-group of the Wianamatta Shales.

The Bringelly Shales do not provide significant raw material resources for the production of stone tools. Raw material outcrops which contain material that is suitable for the manufacture of stone tools, such as silcrete, are located at Luddenham to the south; Erskine Park approximately 14km to the north; St Clair approximately 15km to the north; and Plumpton approximately 20km to the east. Other material used in the manufacture of stone tools on the Cumberland Plain, includes chert, mudstone, quartz, basalt and quartzite, which are located with the Rickabys Creek Formation, 30km north of the survey area (Central Mapping Authority of NSW, Department of Lands 1991) and which weather out of the Hawkesbury Sandstone of the Sydney Basin.

Figure 6 below shows the study area on the Penrith 1:100,000 geological map.

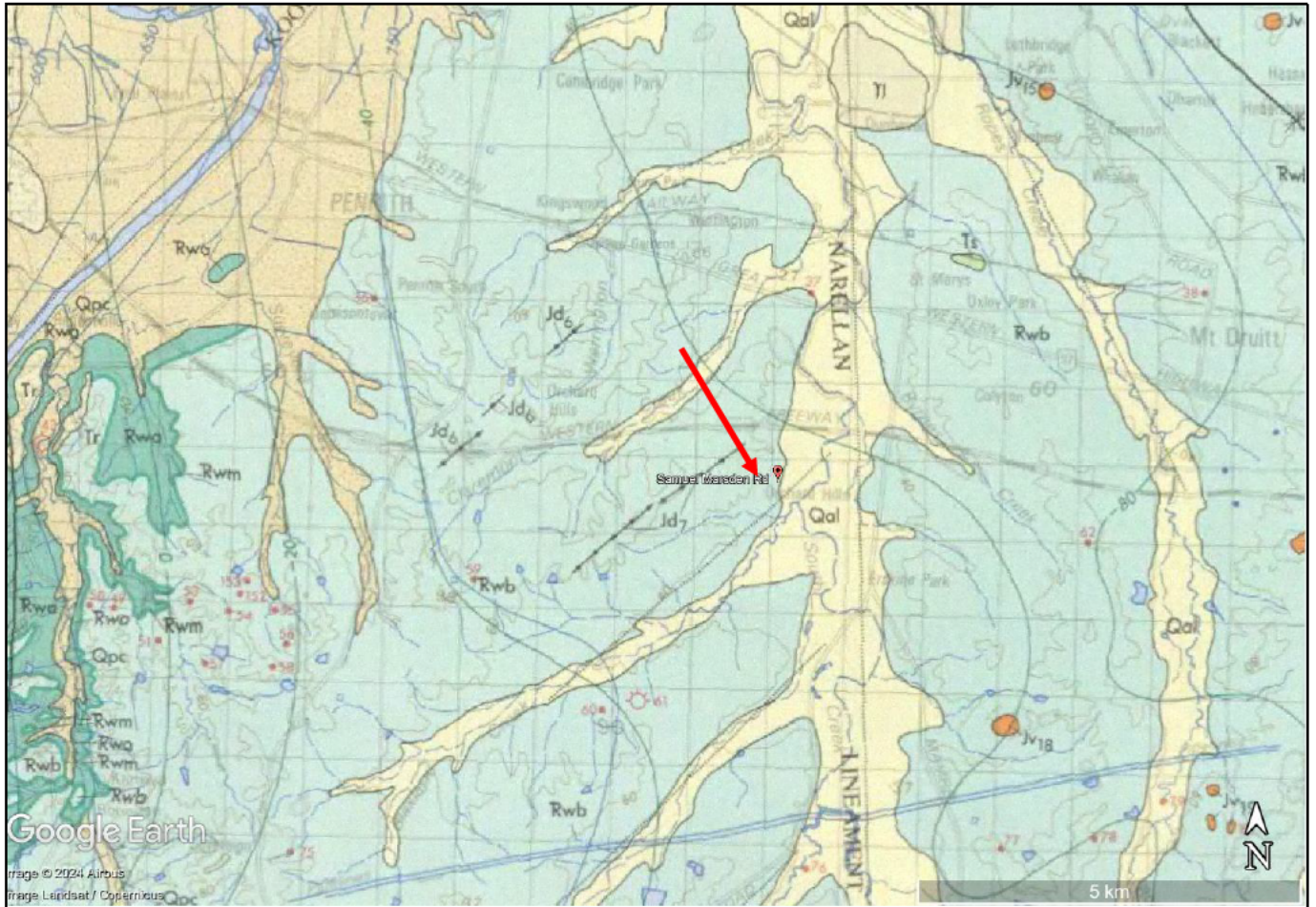


Figure 6: Showing the location of the study area indicated by the red arrow on the Penrith 1:100,000 Geological Map (map courtesy of Google Earth Pro).

2.4 Soils

The study area crosses through the Blacktown Residual Soil Landscape (9130bt) into the South Creek Alluvial Soil Landscape (9130sc).

Those soil landscapes are characterised by the following soil profiles as taken from *Soil Landscapes of the Penrith 1:100,000 Sheet* (Bannerman and Hazelton 2011:39–41; 100–101):

Blacktown Residual Soil Landscape (9130bt)

A horizon (topsoil): brownish black loam (10YR 2/2, 5YR 3/2, 10YR 3/45). Rounded iron indurated fine gravel sized shale fragments and charcoal fragments may be present and roots are common.

A2 horizon (topsoil): hardsetting brown clay loam (7.5YR 4/3, 2.5YR 3/3, 10YR 3/3). Iron indurated gravel sized shale fragments are common, but charcoal fragments and roots are rare.

B horizon (subsoil): mottled brown light clay (2.5YR 4/6, 10YR 4/6). Gravel sized shale fragments are common, but roots and charcoal fragments are rare.

B3 or C horizon (deep subsoil): light grey plastic mottled clay (10YR 7/1, 2.5YR 6/2). Gravel sized shale fragments and roots are occasionally present. Charcoal fragments are rare.

South Creek Alluvial Soil Landscape (9130sc)

A horizon (topsoil): brown loam (5YR 4/3 – 10YR 4/3). Roots are abundant in surface layers, charcoal and other inclusions do not occur.

A horizon (topsoil): hardsetting, dull brown clay loam (7.5YR 5/4, 5YR 4/2, 10YR 5/6). Stones and other inclusions do not occur, and roots are rarely found.

B horizon (subsoil): bright brown clay (5YR 4/8 – 10YR 5/1). Roots are only present when this material occurs as topsoil. There is no charcoal present, but small gravels may make up to 50% of the volume.

2.5 Vegetation

Historically the study area would have been located within an area of the Alluvial Woodland vegetation community. The upper storey is dominated by Cabbage Gum (*Eucalyptus amplifolia*) and red iron gum (*Eucalyptus tereticornis*) and, less frequently rough barked apple (*Angophora floribunda*). This upper storey sits above a stratum comprised of smaller trees including Parramatta Wattle (*Acacia parramattensis* subsp. *parramattensis*); swamp she-oak (*Casuarina glauca*); and the narrow leaved paperbark (*Melaleuca linariifolia*).

The understorey is comprised of shrubs and smaller plants dominated by sparse Sweet Bursaria (*Bursaria spinosa*); and a dense ground cover dominated by grasses such as Australian basket grass (*Oplismenus aemulus*); weeping grass, (*Microlaena stipoides* var. *stipoides*); bordered panic grass (*Entolasia marginate*); and hedgehog grass (*Echinopogon ovatus*) (Stening 2017:11).

In pre-colonial times, the vegetation of the Cumberland Plain would have provided significant resources for Aboriginal people. Vegetation communities can provide food, medicine and raw material for making objects. The vegetation communities support a variety of fauna such as possums, wallabies and other small mammals, birds and lizards which were all a part of the Aboriginal diet. The river and creek systems provided fresh water for Aboriginal people and provided further animal and plant resources.

2.6 Land Use History and Current Land Use

The study area is comprised of the road verge of Landsdowne and Samuel Marsden Roads and the property at the end of Samuel Marsden Road. The roads of Landsdowne and Samuel Marsden Roads are bitumen without concrete gutters or formalised footpaths. Evidence of drainage channels and creek crossings were observed along the length of the road reserve. The property at the end of Samuel Marsden Road is comprised of a semi rural block that contains a large single storey farm building surrounded by overgrown vegetation, grass and weeds.

The 1965 aerial photograph shows the study area being cleared farmland with a waterhole located just in front of the location of the existing farm building.

Sydney Water plans from 1970 (Figure 7) and 1971 (Figure 8 and Figure 9) show extensive Sydney Water infrastructure being constructed through Lot 19 DP238495 at this time. The plans show Sydney Water constructed pipes throughout the study area. The 1975 and 1986 aerial photographs show the study area remaining undeveloped and the Western Motorway being formed. There is no evidence to indicate that any structures have previously been built within the property at the end of Samuel Marsden Road where the sewer main will connect into the existing Sydney Water DN1350 submain, prior to the construction of the existing farm building which appears to have been constructed between 1991 and 1998. Sydney Water plans from 1991 (Figure 10) appear to show similar infrastructure to that shown in the 1971 plans.

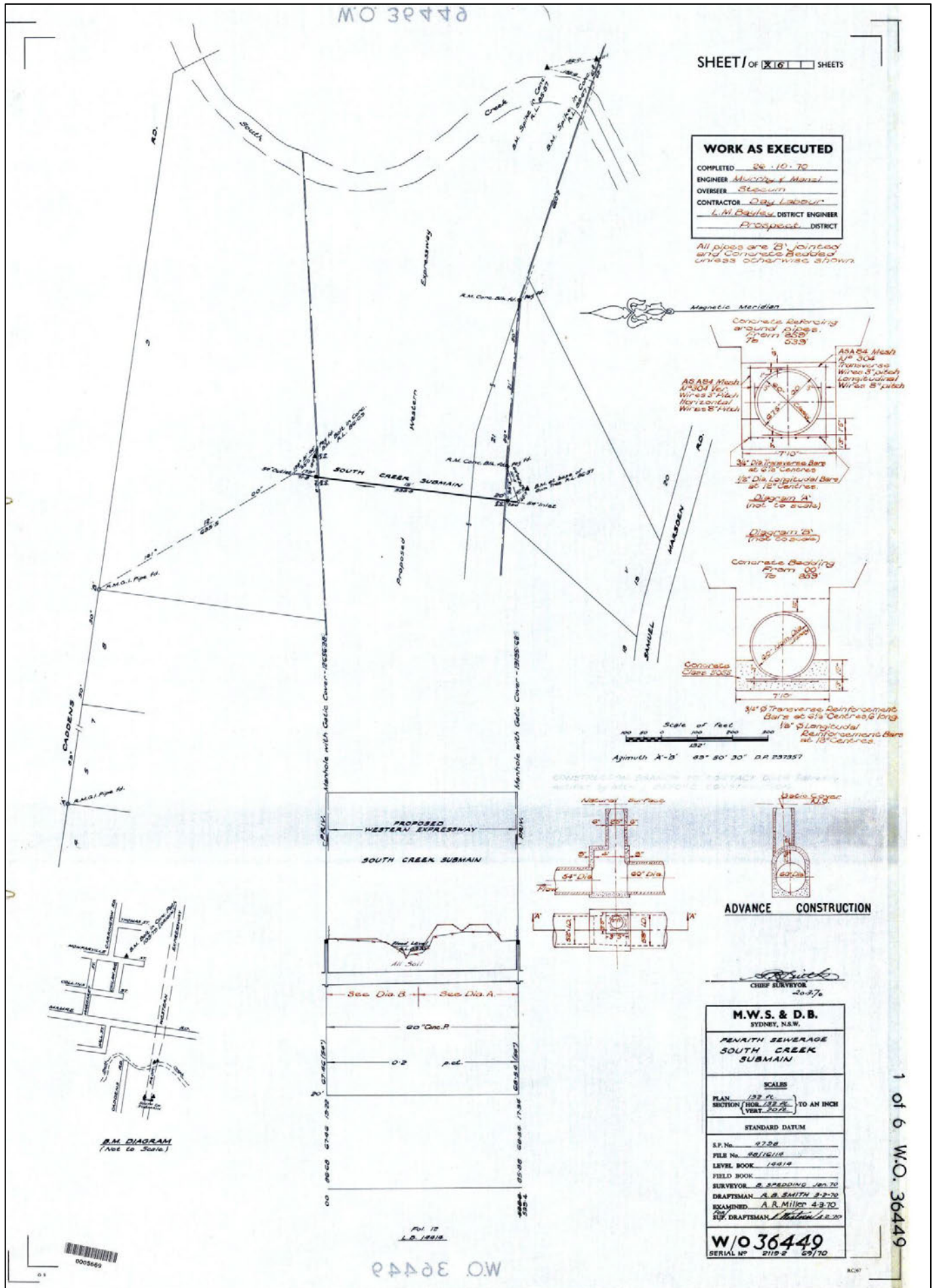


Figure 7: Sydney Water plan dated 1970 showing Lot 19 DP238495 outlined in red and showing the extensive infrastructure through Lot 19 DP238495 (plan courtesy of Sydney Water).

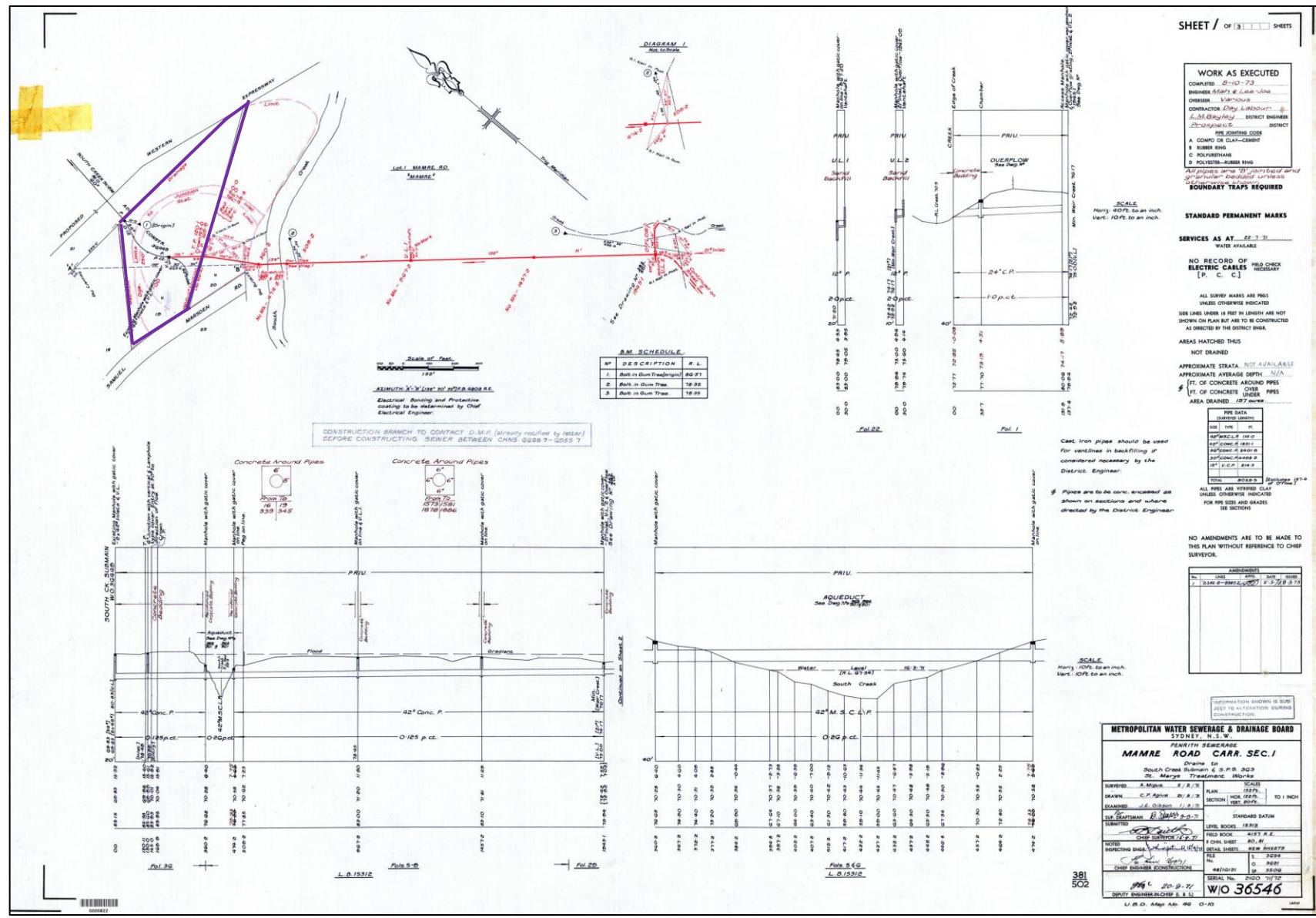


Figure 8: Sydney Water plans from 1971 showing Lot 19 DP238495n outlined in purple and showing the extensive Sydney Water infrastructure through this area (plans courtesy of Sydney Water). A close up of the plan is provided in Figure 9 below.

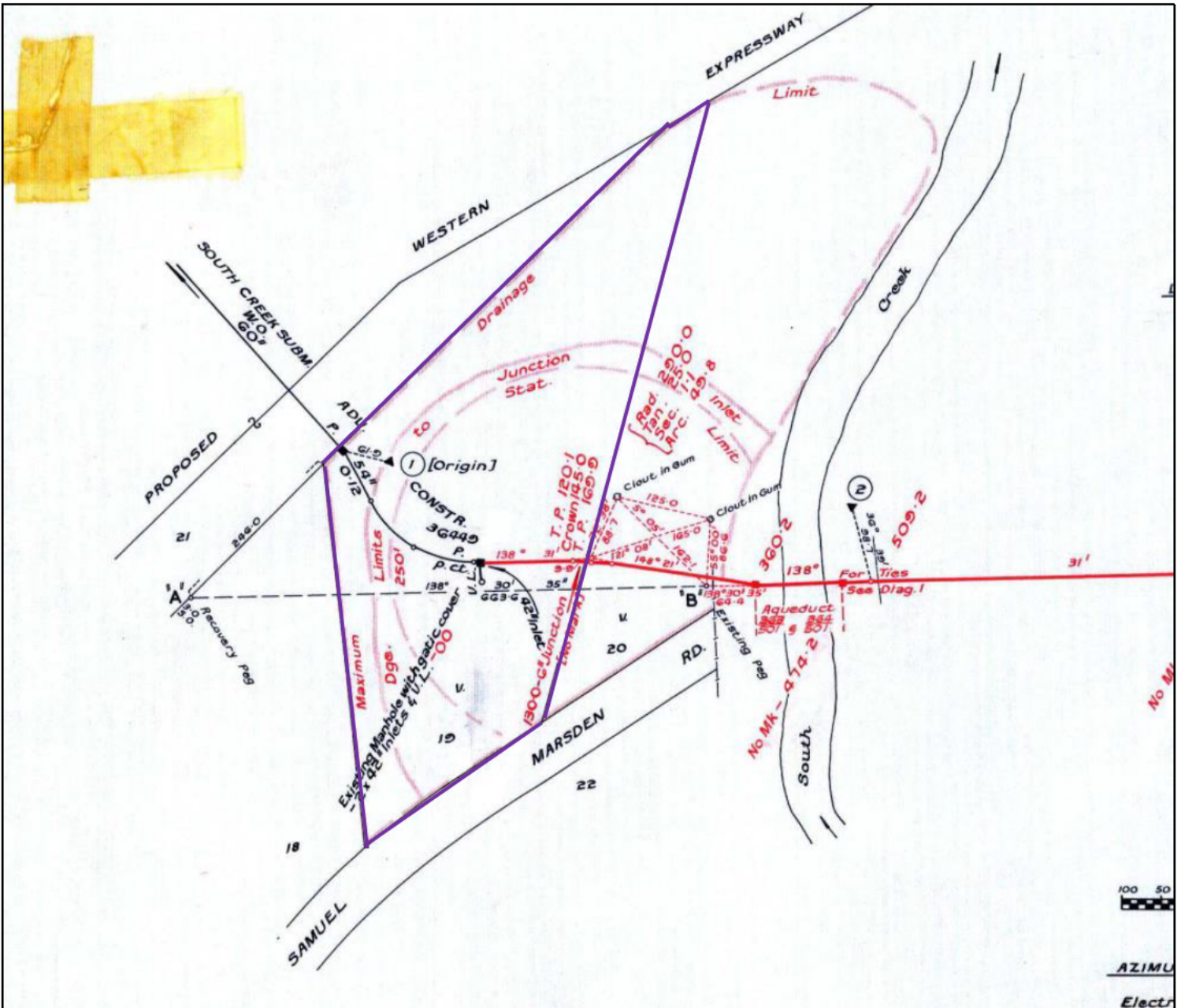


Figure 9: Showing a close up of the Sydney Water plan from 1971 shown in Figure 8 above. Lot 19 DP238495 is outlined in purple (plan courtesy of Sydney Water).

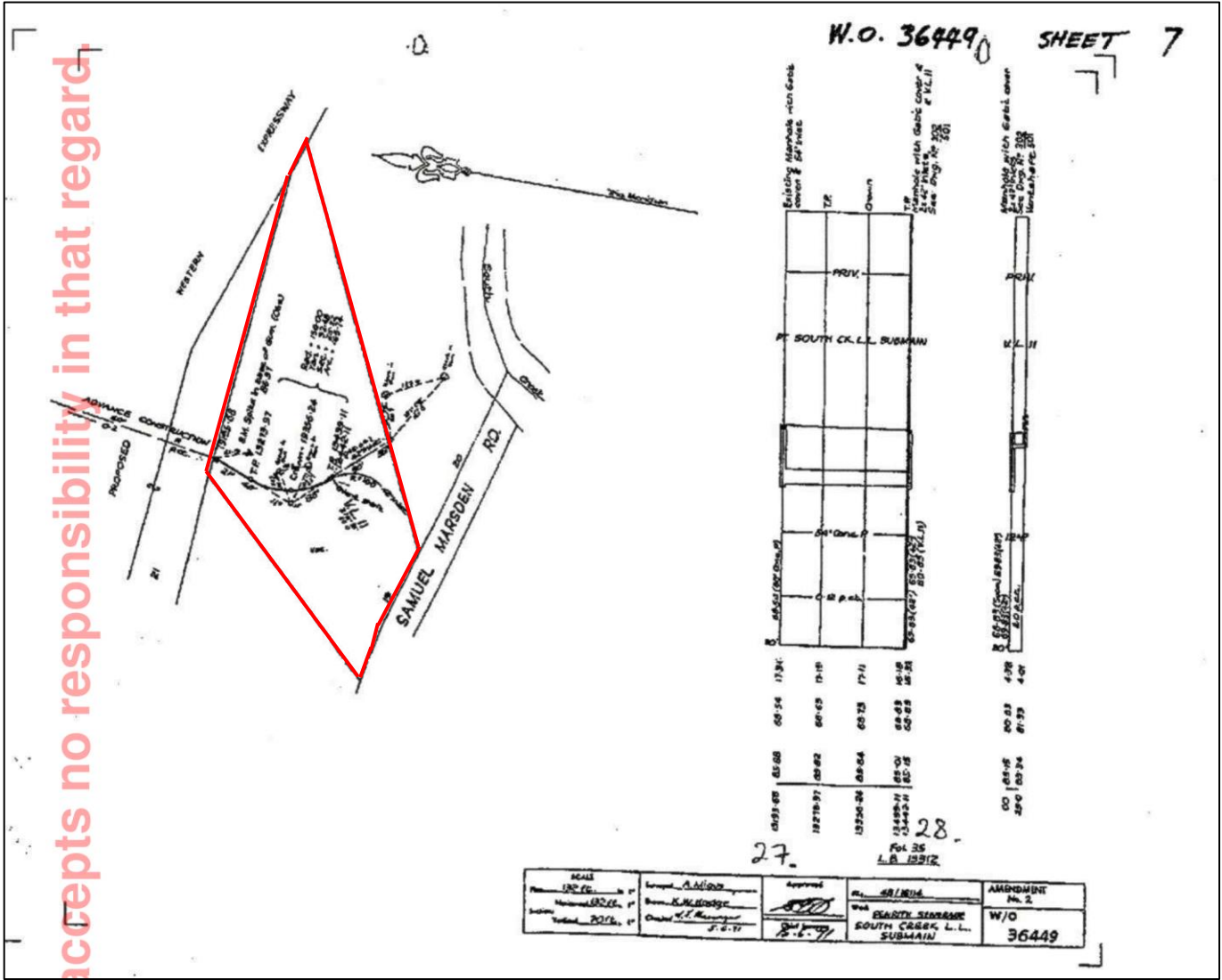


Figure 10: Showing the Sydney Water plans from 1991. Lot 19 DP238495 is outlined in red and the Sydney Water Infrastructure through the Lot 19 DP238495 is extensive (plans courtesy of Sydney Water).

3.0 Archaeological Context

3.1 Cumberland Plain

Research into the regional and local archaeological context of the study area can be used to develop an understanding of the patterning of Aboriginal land use and enable the preparation of a predictive model to determine the likelihood of particular site types being located within the study area.

The Last Glacial Maximum (LGM), the last period when Earth's ice sheets were at their maximum glaciation, occurred between 15,000 – 18,000 years ago. Sea levels were up to 130m below current sea levels during this period (Nutley 2006:1). As temperatures started to rise at the end of the LGM, the polar ice caps started to melt and sea levels began to rise, and in doing so helped to form the present day Sydney landscape.

As sea levels rose, people were forced to move inland, abandoning formerly coastal sites which were now being inundated by the sea (Nutley 2006). Sea levels began to stabilise about 6,000 years ago and the majority of sites around the Sydney region date to the last 5,000 years after sea levels had stabilised. Research into submerged Aboriginal sites has demonstrated that several submerged sites in the Sydney region date to more than 10,000 years BP.

In 1989 the National Parks and Wildlife Service engaged Smith to undertake an Aboriginal Site Planning Study to assist in the management of Aboriginal sites on the Cumberland Plain (Smith 1989), as the number of archaeological investigations being undertaken in the region was increasing due to increasing development.

Smith's study indicated that site location and site densities were heavily influenced by the availability of water and of raw materials to manufacture tools, however other environmental factors including topography, soil type and vegetation had significantly less influence on site location and densities (1989:3). She states that sites "will most likely occur along permanent creeks and within and around swamp margins" (1989: 2). When discussing the Liverpool Local Government Area where the present study area is located, Smith notes that in this area, factors such as soils, topography and vegetation do not influence site location but rather that the vast majority of artefacts within the area are located within 100m of water and that artefacts scatters were most likely to be found in association with permanent water sources (Smith 1989).

The burgeoning expansion of development into southern, northern and western Sydney has increased since Smith's (1989) study, resulting in a significant increase in the archaeological investigation of the Cumberland Plain. The results of these archaeological assessments and excavations has demonstrated the complexity of the archaeological record across the region. In particular, ongoing research and investigation has indicated that the presence of surface artefact scatters does not indicate the full nature and extent of the archaeological deposit. Archaeological deposits can be located despite historical disturbance and in locations with a lack of surface artefacts. The research has indicated that more complex sites with higher artefact densities are generally located on permanent water sources and areas with major confluences present are prime site locations (Stening 2016:11).

Kohen's (1997) studies around Penrith determined that sites such as surface artefact scatters, rock shelters and grinding grooves "are particularly likely to occur adjacent to the rivers and creeks", such as the Nepean River, a fifth order stream.

In 2005, the results of McDonald's excavations in the Rouse Hill Development Area refined the model of occupation for the Cumberland Plain (2005). She examined site location, mobility and change over time, in relation to stream order. Her study determined that confluences of second and third order streams with other watercourses are more likely to contain major, complex sites.

She examined the dynamic nature of lithic, or stone tool, technologies across the Cumberland Plain. She analysed the manner in which "stone technologies were organised in relation to landscape" and the way in

which technologies and the model of occupation across the Cumberland Plain changed over time in response to environmental factors (McDonald 2005: np). As sea levels rose and population levels increased in the region, sites become more intensively occupied and some groups live permanently in the Cumberland Plain. As such, emphasis is placed on locally sourced raw materials for the manufacture of stone tools and lithic technology changes accordingly (McDonald 2005: np).

McDonald’s excavation methodology demonstrated that a lack of artefacts on the surface does not reflect the actual archaeological potential of a site. She states that “despite artefacts being rare or completely absent on the surface of each of the sites investigated, all six sites were found to contain intact archaeological deposit” (McDonald 2005: np). Sites were selected for investigation based on their assessed archaeological potential.

McDonald’s extensive studies across the Cumberland Plain have resulted in a predictive model for the region. She determined that sites located on fourth or fifth order streams are likely to be more complex and possibly stratified indicating ongoing, repeated, lengthy occupation at these locations. Sites with evidence of frequent occupation are likely to be located within third order stream catchment areas. Second order streams have the potential to contain sites which reflect occasional occupation.

Comber’s excavations at Penrith Lakes (2010) confirmed the model of occupation presented by Kohen (1997) and McDonald (2005). Excavations were undertaken in two locations, adjacent to the Nepean River, a fifth order stream. Her excavations revealed that despite only a low density artefact scatter being present on the surface at each location, more than 1,000 artefacts were collected from a highly stratified, intensively occupied site.

Excavations undertaken at a highly disturbed location adjacent to Eastern Creek, a third order stream, at Doonside (Stening 2011). These excavations demonstrated that despite no surface artefacts being recorded, more than 1,000 artefacts were uncovered. Analysis showed that the site had been occupied by a larger, more complex group over more extensive periods of time.

Smith (1989), Kohen (1997) and McDonald’s (2005) model of occupation for the Cumberland Plain indicates that larger, more complex sites are more likely to be located at the confluence of several watercourses, especially higher order streams. Evidence of frequent occupation is likely to be located within third order stream catchment areas, despite a lack or a low density of surface artefacts. First and second order creeks are likely to contain evidence of less complex and lower density sites. Therefore, given the present study area is located in the catchment between a second and third order stream, evidence of Aboriginal occupation could be predicted.

3.2 Orchard Hills

A search of the Aboriginal Heritage Information Management System (AHIMS) database on 5th March 2024 indicates that there are three registered Aboriginal sites in the vicinity of the study area. Table 1 below shows the details of the three registered Aboriginal sites within the vicinity of the study area.

AHIMS No.	Site Name and Location	Site Type
45-5-4430	“Kent Road South 12A”, located on the southern side of the M4 Western Motorway, approximately 420m east of the Kent Road overpass and 270m north west of Samuel Marsden	Two silcrete flake fragments located 5m apart on a 3m wide fire break track. The site was completely destroyed under an AHIP by the upgrade of the M4 Western

	Road. It is located approximately 670m from South Creek. The site is located on a ridge bisected by the M4 Motorway.	Motorway and was assessed as retaining no archaeological significance.
45-5-4431	“Kent Road South 12B”, located on the southern side of the M4 Western Motorway, approximately 265m east of the Kent Road overpass and 370m north west of Samuel Marsden Road. It is located approximately 800m. The site is located in a swampy low lying area on a ridge slope south of the westbound carriageway of the M4 Motorway.	A single silcrete flaked piece identified in a swampy low lying area on a ridge slope. The site was completely destroyed under an AHIP by the upgrade of the M4 Western Motorway and was assessed as retaining no archaeological significance.
45-5-4477	“South Creek 4”, located on the eastern side of Kent Road, approximately 40m north of the M4 Western Motorway and 80m south east of the intersection of Coachwood Drive and Doncaster Avenue. It is located approximately 670m south west of South Creek. The site is located on a hill crest on the northern side of the M4 Motorway.	A quartz flake and a chert flake located on a track. The site was completely destroyed under an AHIP by the upgrade of the M4 Western Motorway and was assessed as having no intact archaeological deposit.

Table 1: Showing the details of the registered AHIMS sites in the vicinity of the study area.

3.3 The Study Area

A search of the Aboriginal Heritage Information Management System (AHIMS) on 5th March 2024 indicates that there are no registered Aboriginal sites within the study area.



Figure 11: Showing the location of registered AHIMS sites, indicated by the Aboriginal flags, in the vicinity of the study area, indicated by the red line (map courtesy of Google Earth Pro).

3.4 Predictive Model

The above environmental and archaeological research indicates that the Cumberland Plain and Orchard Hills were significant landscapes for Aboriginal people. Based on that environmental and archaeological information, the following site types could be expected within the study area:

1. Open artefacts scatters: characterised by surface scatters of Aboriginal objects or artefacts embedded in deposits. Types and densities of raw materials used reflect proximity to the source.
2. Isolated finds: comprising a single artefact which may be the result of tool loss, maintenance or discard, or may be evidence of larger buried or heavily disturbed sites.

4.0 Methodology

4.1 Background Research

A search of the Heritage NSW's AHIMS database was undertaken on 5th March 2024. Research was undertaken into the environmental background of the study area, outlining the topographic, geological and vegetation context of the study area. An analysis of the archaeological background of the Sydney Basin and Orchard Hills was undertaken. This background research facilitated an understanding of Aboriginal land use patterns within the region and the preparation of a predictive model of occupation.

A review of plans for the proposed development of the study area enabled an understanding of the impact of the proposed works on any potential archaeological deposit.

4.2 Site Inspection

A site inspection was undertaken on 15th February 2024 by Tory Stening.

The entire study area was inspected on foot to develop an understanding of the environmental and potential archaeological context and to record any evidence of Aboriginal occupation.

The surrounding landscape was also examined to facilitate an understanding of the environmental context of the study area and to attempt to locate previously recorded Aboriginal sites within the vicinity of the study area.

4.3 Report

This Aboriginal due diligence assessment report was prepared in accordance with the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in New South Wales* (Office of Environment & Heritage 2011) and *Due diligence code of practice for the protection of Aboriginal objects in NSW* (DECCW 2010).

5.0 Results and Mitigation

5.1 Results

The site inspection was undertaken on the 15th February 2024 and the whole of the study area was inspected on foot with particular attention being paid to the historic topography and the disturbance from European development. No Aboriginal objects or sites were recorded during the site inspection. An AHIMS search dated 5th March 2024 indicates that no Aboriginal sites had previously been recorded within the study area.

The proposed gravity sewer main will be constructed in the road reserve from the Orchard Hills Metro Station along Lansdowne Road, up Samuel Marsden Road and intersect with the existing Sydney Water DN1350 South Creek submain on the northern boundary of the property at the end of Samuel Marsden Road. Proposed construction is via open trenching and underboring where required, e.g. where space in the road verge is limited. Maintenance holes are proposed along the route with a maximum interval of approximately 250m.

The proposed sewer main is located within an area of potential archaeological sensitivity due to its proximity to and location between two second order creeks. The predictive model developed by McDonald and Mitchell (1994) for the Cumberland Plain indicates that archaeological deposits could be present within the present study area.

During the site inspection, the ground surface of the entire length of the proposed sewer main was inspected carefully to understand the level of disturbance and to identify any Aboriginal objects. The road reserve along Lansdowne and Samuel Marsden Roads was highly disturbed during the construction and ongoing maintenance of the roads and properties along the roads and the installation of above and underground services and drainage channels. No Aboriginal objects were located during the site inspection.

The property at the end of Samuel Marsden Road where the new proposed sewer main will connect into the existing Sydney Water DN1350 submain appears from the historical aerial photograph to have been utilised as cleared farmland and remained without above ground structures until the 1990s when the existing farm building was constructed between 1991 and 1998. The 1965 aerial photograph shows a water hole present just to the north of the existing farm building. Evidence of this water hole is no longer visible in the 1975 aerial photograph. Sydney Water plans from 1970 and 1971 show that Sydney Water constructed extensive infrastructure across Lot 19 DP238495. It is likely that the construction of this infrastructure included drainage for the water hole in the centre of the property. Sydney Water plans from 1991 show similar infrastructure to that shown in the 1971 plans.

The predictive model indicates that archaeological deposits could be expected within the study area due to the location of Lot 19 DP238495 adjacent to Blaxland Creek and the presence of a water hole within the property on the 1965 aerial photograph which indicates that this could have been a resource or camping area for the Aboriginal people of the area. However, the whole of the road reserve of both Lansdowne and Samuel Marsden Roads is highly disturbed by drainage, services and road construction. The property at the end of Samuel Marsden Road (Lot 19 DP238495) has been subjected to significant disturbance in the form of the construction of the Sydney Water infrastructure in the early 1970s. However, it appears to have been utilised as cleared farmland and remained undeveloped until the 1990s when the existing farm building was constructed. Therefore, it is considered highly unlikely that *in situ* Aboriginal archaeological deposits remain within the study area due to the extensive disturbance caused by the construction of Sydney Water infrastructure, drainage, roads, and above and underground services. It is not expected that the proposed works will impact on any Aboriginal objects or sites.

5.2 Impact and Mitigation

As it is not anticipated that any evidence of Aboriginal occupation or any Aboriginal objects will be impacted upon by the proposed works, there will not be any impacts on any Aboriginal cultural heritage. Therefore, no further archaeological investigation in respect of Aboriginal archaeology is required for the proposed alterations and additions. An Aboriginal Heritage Impact Permit (AHIP) will not be required.

If during the proposed works, any unexpected Aboriginal objects or evidence of Aboriginal occupation: such as Aboriginal objects; is uncovered, all work must cease in the vicinity of the suspected Aboriginal objects or evidence of Aboriginal occupation, and further advice should be sought from a qualified archaeologist.

In the unlikely event that any skeletal material is uncovered during the proposed works, all work must cease immediately on site and the following steps must be undertaken:

1. Not further disturb or move these remains.
2. Immediately cease all work at the particular location.
3. Notify NSW Police.
4. Notify Heritage NSW's Environment Line on 131 555 as soon as practicable and provide available details of the remains and their location.
5. Not recommence any work at the particular location unless authorised in writing by Heritage NSW.
6. Any Aboriginal ancestral remains must be recorded and reported under the direct supervision of a specialist physical anthropologist, such as Dr Denise Donlon at the University of Sydney.

6.0 Legislation

6.1 The National Parks & Wildlife Act 1974 (as amended)

The *National Parks & Wildlife Act 1974* (NPW Act) provides statutory protection to all Aboriginal objects and Aboriginal places within New South Wales. Heritage NSW within the Department of Planning and Environment is the State Government agency responsible for the implementation and management of this Act.

Part 6 of the *National Parks & Wildlife Act* provides provision for the protection of all Aboriginal “objects” which are defined as “any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains”. Part 6 of the Act states that it is an offence to harm or desecrate an Aboriginal object or Aboriginal place, without an Aboriginal Heritage Impact Permit (AHIP).

This assessment was undertaken in accordance with the *Due diligence code of practice for the protection of Aboriginal objects in NSW* (DECCW 2010) and *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (Office of Environment & Heritage 2011).

This assessment has concluded that it is highly unlikely that Aboriginal objects remain within the study area and will be impacted by the proposed works. Therefore, no further archaeological investigation is required in respect of these works.

7.0 Recommendations

The following recommendations are made in accordance with:

- The legal requirements of the *National Parks & Wildlife Act 1974* (as amended) which states that it is an offence to harm or desecrate an Aboriginal object without gaining prior consent of the Director General of the Department of Planning and Environment.
- Research into the environmental and archaeological record of the study area.
- The results of this Aboriginal archaeological assessment which concludes that it is highly unlikely that subsurface archaeological deposits remain within the study area.

Therefore, it is recommended that:

1. No Aboriginal objects were recorded during the site inspection and it is not expected that any sites or subsurface deposits will be harmed during the proposed works. There is no objection to the construction of the proposed sewer main on Aboriginal archaeological grounds and no further archaeological investigation is required.
2. If during the proposed works any unexpected Aboriginal objects, or any other evidence of Aboriginal occupation is uncovered, all work must cease in the vicinity of the suspected Aboriginal objects or evidence of occupation, and further advice should be sought from a qualified archaeologist.
3. If, in the unlikely event, any skeletal material is uncovered during the proposed works, all work must cease and the following steps be immediately undertaken:
 - a) You must not further disturb or move these remains.
 - b) You must immediately cease all work at the particular location.
 - c) You must notify NSW Police.
 - d) You must notify Heritage NSW's Environment Line on 131 555 as soon as practicable and provide available details of the remains and their location.
 - e) You must not recommence any work at the particular location unless authorised in writing by Heritage NSW.
 - f) Any Aboriginal skeletal remains must be recorded and reported under the direct supervision of a specialist physical anthropologist.

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Photographs



Photograph 1: Showing the property at the end of Samuel Marsden Road where the proposed sewer main will connect to the existing Sydney Water DN1350 submain. The existing farm building is visible on the right of the photo.



Photograph 2: Showing the area to the north of the existing farm building where a small waterhole was present in the 1965 aerial photograph.



Photograph 3: Looking toward the M4 Motorway with the existing farm building to the left of the photo.



Photograph 4: Showing the overgrown vegetation at the end of Samuel Marsden Road.



Photograph 5: Facing west and looking along Samuel Marsden Road. The proposed sewer main will be constructed in the road reserve to the right of the photo.



Photograph 6: Facing west and looking along the road reserve of Samuel Marsden Road where the proposed sewer main will be constructed.



Photograph 7: Showing evidence of drainage channels within the road reserve.



Photograph 8: Showing evidence of drainage pipes installed beneath driveways along Samuel Marsden Road.



Photograph 9: Showing evidence of a creek within the road reserve of Samuel Marsden Road.



Photograph 10: Showing evidence of underground services within the road reserve of Lansdowne Road.




Photograph 11: Showing evidence of drainage channels within the road reserve.



Photograph 12: Showing the imported gravels and disturbance of the Lansdowne Road road reserve.

Appendix A: AHIMS Search Results

		AHIMS Web Services (AWS)					Your Ref/PO Number : Orchard Hills Client Service ID : 870188			
Extensive search - Site list report		Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-5-4430	Kent Road South 12A	GDA	56	292142	6259600	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Matthew Kelleher,Matthew Kelleher					Permits	3762	
45-5-4431	Kent Road South 12B	GDA	56	291991	6259609	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Matthew Kelleher,Matthew Kelleher					Permits	3762	
45-5-4477	South Creek 4	GDA	56	292197	6259703	Open site	Destroyed	Artefact : -		
	Contact	Recorders	Helen Brayshaw,Kelleher Nightingale Consulting Pty Ltd,Miss.Kristen Taylor					Permits	4001	

**** Site Status**
Valid - The site has been recorded and accepted onto the system as valid
Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.
Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground
Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on [REDACTED] for the following area at Lat, Long From : -33.7913, 150.7476 - Lat, Long To : -33.7824, 150.7631. Number of Aboriginal sites and Aboriginal objects found is 3

This information is not guaranteed to be free from error omission. Heritage NSW and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

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Appendix C – Preliminary Noise Assessment

Noise Assessment

Part A –Information of Works

Location Description:	Samuel Marsden Road, Orchard Hills
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1. Description of Proposed work and location map:

OOH are not considered likely due to anticipated ROL conditions. Works will include:
 - concrete saw cutting.

The property at 13b Harrier Place was identified as the nearest residential receiver to potential concrete saw cutting works as shown in the Figure below. (note: a noise wall extend around the northwest corner of Caddens and Kent Roads)



Kent Road is located in Noise Catchment Area (NCA) 08. NCA 08 is described as predominantly low-density single storey residential dwellings. East of the project is mostly open land with scattered receivers along Samuel Marsden Road and Lansdowne Road. Ambient noise conditions are dominated by traffic
 Noise management levels (NML) and sleep disturbance criteria for NCA 08 are identified in the table below. Highly Noise Affected (HNA) residential receivers are those where exceedances above 75dBA are predicted.

Part A –Information of Works

NOISE MANAGEMENT LEVEL (NML) DB(A)

NCA	Standard Hours	OOH-Day ²	OOH – Evening ²	OOH – Night ²	Sleep Disturbance ³
08	54	49	49	45 ^{4,5}	55 ⁴

Standard construction hours are 7am to 6pm (Mon to Fri) and 8am to 1pm (Sat)

² Out-of-hours (OOH): OOH Day from 1pm to 6pm Saturday; 8 am to 6 pm Sunday and Public holidays; OOH Evening from 6 pm to 10 pm Monday to Saturday and 6pm to 10pm Sunday; OOH Night from 10pm to 7am Monday to Friday, and from 10pm to 8am Saturday, Sunday and Public holidays

³ Sleep disturbance criteria applicable to OOH Night period

⁴ Sleep disturbance criteria of LAF_{max} 52 dB(A) has been adopted as the sleep disturbance criteria

⁵ Where evening or night NMLs exceed that of the previous period, they have been set at the NML of the previous period, in line with the NPfl, to reflect community's expectation for greater noise control during more sensitive periods

2. Plant and equipment: List type and size (break down plant into scenarios)

No.:	Proposed plant and equipment:
Scenario 1 – Concrete sawing	
1	Concrete saw
2	Excavator
Scenario 2 – Underbore activity	
1	Underbore
2	Mudpump and generator
3	Body truck - delivery

Part B – Noise & Vibration Impact Assessment

3. Noise and Vibration Impact Assessment Outcomes

(modelling results to be attached)

NOISE RESULT SHEET - concrete cutting and excavation

$$SPL = SWL(\text{point}) - 20\log(r) - 8$$

Quick Calculator (user inputs as outlined below)

Noise SWL (dBA)	Distance (m)	SPL (dB(A))	Additional Air Attenuation (dBA)	Additional Attenuation (hoarding etc) (dBA)	Predicted Noise level (dBA)
114	20	80	3	5	72

Noise Management Levels

Distance	NML
54	User defined
75	HNA

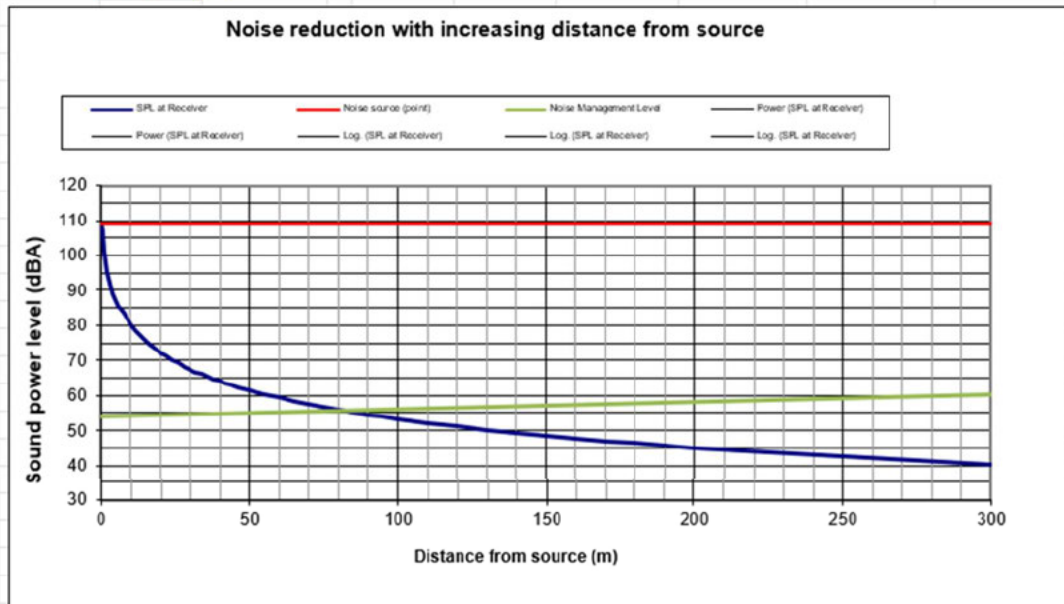
NML Exceedance

18

m n

HNA

Compliant



Assumptions:

Concrete cutting works at 20m indicative of worst case noise impacts

Additional 5db attenuation due to localised use of noise blankets around concrete saw activities

NOISE RESULT SHEET - underbore activity + one delivery truck

$SPL = SWL(\text{point}) - 20\log(r) - 8$

Quick Calculator (user inputs as outlined below)

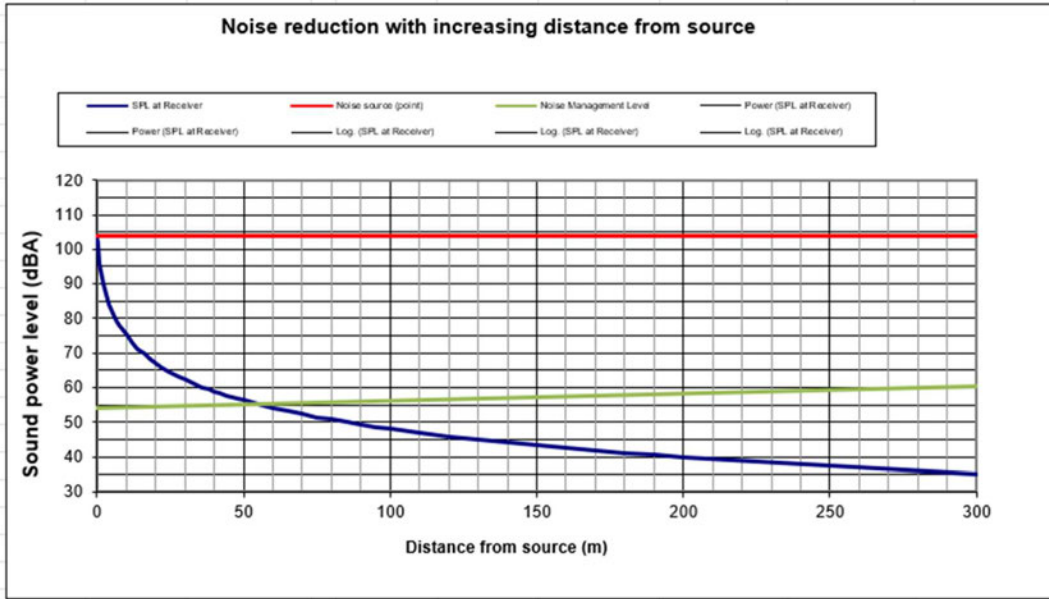
Noise SWL (dBA)	Distance (m)	SPL (dB(A))	Additional Air Attenuation (dBA)	Additional Attenuation (hoarding etc) (dBA)	Predicted Noise level (dBA)
109	20	75	3	5	67

Noise Management Levels

Distance	NML
	54 User defined
	75 HNA

NML Exceedance	13
HNA	Compliant

m n



Assumptions:

- Underbore works at 20m indicative of worst case noise impacts
- Additional 5db attenuation due to localised use of noise blankets around boring setup as needed.
- Attenuation is expected to be higher.

Part C – Noise & Vibration Impact Assessment

Concrete saw cutting and underbore activity in the vicinity of residential receivers is predicated to generate noise levels which exceed both the evening and nighttime NMLs as well as sleep disturbance criteria. While the NML for standard construction hours would also be exceeded by these works HNA noise levels are not anticipated.

A DNVIS is required for any OOH works.