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Report on
Desktop Surface Water and Groundwater Assessment

Proposed Budawang School Relocation
17 Croobyar Road, Milton

Prepared for
School Infrastructure New South Wales (SINSW)

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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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Report on Desktop Surface Water and Groundwater Assessment
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1. Introduction

Douglas Partners Pty Ltd (DP) has been engaged by School Infrastructure New South Wales (SINSW) to undertake Desktop Surface Water and Groundwater Assessment work (the 'assessment') within part of the former Shoalhaven Anglican College at 17 Croobyar Road, Milton (the 'site'). The investigation was commissioned in an email dated 25 January 2021 from Ms Samanta Piatek of S.J.A Construction Services Pty Ltd (project managers) on behalf of SINSW (the client) and was undertaken in general accordance with DP variation letter WOL200347 Variation 3 dated 10 December 2020.

The site covers an approximate area of 2.4 ha, the location and layout of which, is presented on Drawing 1 in Appendix B. DP understands that the site is proposed to be developed for the relocation of the Budawang School. The proposed development of the site will include the demolition of some of the existing buildings and the construction of new school buildings together with proposed car parks and pavements. A revised master plan was provided to DP by S.J.A Construction Services Pty Ltd. As requested, the revised master plan has also been included in Appendix B of this report.

It is understood that the assessment is required in accordance with Section 18 of the Planning Secretary's Environmental Assessment Requirements for the development which includes the following:

- "*Provide:*
  - *An assessment of potential impacts on surface and groundwater (quality and quantity), soil, related infrastructure and watercourse(s), riparian land, and groundwater dependant ecosystems where relevant and measures proposed to reduce and mitigate these impacts. Details of measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles*

The assessment comprised the following:

- Desktop review of information provided by the client including previous investigations undertaken by others, plans showing existing stormwater management infrastructure and proposed development plans relating to potential future interactions with groundwater and surface water (i.e. proposed excavations, sub surface structures or stormwater management infrastructure);
- Desktop review of published site mapping, NSW Office of Water registered groundwater bores and Council records;
- Review of previous investigations undertaken by DP in the surrounding area;
- A site walkover specifically looking at the water course present in the north-western portion of the site; and
- Preparation of this report including recommended environmental management procedures and control plans.

2. Review of Previous DP Investigations

The assessment has included the review of the following previously issued DP reports:

- DP's *Report on Preliminary Site Investigation for Contaminated Land, Proposed Seniors Living Development, 17 Croobyar Road, Milton*, DP project 89390.01, dated March 2018 (DP, 2018);
- DP's *Report on Geotechnical Investigation, Proposed Budawang SSP Relocation, 17 Croobyar Road, Milton*, DP project 89390.02 dated November 2020 (DP, 2020a);
- DP's *Limited Intrusive Investigation for Contaminated Land, Proposed Budawang SSP Relocation, 17 Croobyar Road, Milton*, DP project 89390.02 dated December 2020 (DP, 2020b); and
- DP's *Report on Salinity Investigation and Management Plan, Proposed Budawang School Relocation, 17 Croobyar Road, Milton*, DP project 89390.03 dated April 2021 (DP, 2021).

2.1 DP, 2018

DP (2018) was undertaken for a larger portion of Lot 200 in Deposited Plan 1192140 than is the subject of the current investigation. The DP (2018) investigation extent included the entirety of the current investigation site.

DP (2018) comprised a review of site information and environmental setting, a review of site history information, a site walkover and preparation of a report.

Based on the findings of the site history investigation and site walkover DP (2018) considered that the site exhibited a low potential for widespread or significant contamination and a moderate potential for localised contamination to exist. This low to moderate potential for contamination existed through the former and current land use of adjacent properties and the progressive development and use as a school. This included, but was potentially not limited to, the following being relevant to the current investigation site:

- the potential for contaminant migration on to the site from off-site sources (adjacent property uses included a coach company and builders' yard);
- the potential use of fill of an unknown origin during the development of the site including the filling of drainage / creek lines;
- the potential storage and use of hazardous chemicals associated with the scholastic use of the site, including horticultural activities, the maintenance of school facilities (e.g. pesticides / termicides etc.) and the maintenance of horticultural equipment;
- the potential use of hazardous building materials in the construction of site structures; and
- the degradation of hazardous building materials that may exist localised to the areas directly adjacent to the site structures.

Based upon the findings of DP (2018), it was recommended that if greater confidence was required regarding the compatibility of the site for the proposed land use then further intrusive investigation of the potential contamination issues should be undertaken.

Furthermore, it was recommended that a hazardous building materials survey be undertaken on all site structures.

2.2 DP, 2020a

DP (2020a) comprised the drilling of boreholes with in-situ testing and sampling followed by laboratory testing of selected samples, analysis and reporting.

The field work indicated slightly variable subsurface conditions, which were typically consistent with previous findings (DP, 2018). The succession of strata was broadly summarised as follows:

TOPSOIL / TOPSOIL FILL:	to depths of 0.1 – 0.2 m in all the boreholes;
FILL:	silty gravel fill to a depth of 1.0 m in Bore 101 and possible fill (sandy clay) in Bore 104 to a depth of 0.5 m;
CLAY:	variably firm to hard (but typically stiff to very stiff) clay and sandy clay to depths of 1.9 – 5.5 m in all boreholes. Bores 101 and 104 were terminated in very stiff to hard clays at depths of 5.5 and 4.0 m, respectively;
MONZONITE:	very low strength monzonite to the termination depths (on refusal of the auger) at depths of 2.2 – 4.0 m in Bores 102, 103 and 105 – 108.

Groundwater seepage was observed at depths of 3.5 m, 3.4 m and 2.7 m in Bores 101, 104 and 107 respectively (i.e. typically within the residual clay profile). No free groundwater was observed in the remaining boreholes during excavation. It was noted however, that the boreholes were immediately backfilled following excavation, sampling and logging which precluded longer term monitoring of groundwater levels. Furthermore, groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

The principal geotechnical items that were discussed as needing to be considered were as follows:

- The site is underlain by monzonite bedrock that typically increases in strength with depth;
- The presence of uncontrolled fill and initially wet near-surface soils in the north-western part of the site;
- The need for the design to allow for the presence of an existing sewer carrier main; and
- Existing structures and services that will require demolition and removal prior to site re-development.

Based on the results of the investigation, the site was considered geotechnically suitable for the proposed Budawang School relocation development, with comments given with respect to site preparation measures, likely reactivity site classifications, retaining wall design parameters, footing design parameters and drainage.

2.3 DP, 2020b

DP (2020b) comprised soil sampling from the investigation locations utilised as part of DP (2020a), laboratory testing for a range of contaminants of potential concern (CoPC) and preparation of a report.

Based on the results of DP (2020b) no significant contaminated land constraints with respect to the on-site reuse of soils was identified in the samples analysed.

Based on the preliminary waste classification undertaken the fill encountered at the site was preliminarily classified as General Solid Waste (GSW) and the natural clays and bedrock are preliminarily classified as Virgin Excavated Natural Material (VENM). Given the preliminary nature of the waste classification it was recommended that further waste classification investigation be undertaken following demolition of site structures and removal of surficial hardstand areas.

It was further recommended that following the complete removal of all fill, assessment should be undertaken to validate that natural materials have not been impacted by former site activities.

As a matter of due diligence, it was recommended that an unexpected finds protocol (UFP) be implemented as part of a construction environmental management plan (CEMP) for any proposed earthworks and development.

It was also recommended that a pre-demolition hazardous building materials survey and testing of the asphaltic concrete for the potential presence of coal tar be undertaken prior to the demolition of the site structures.

2.4 DP, 2021

DP (2021) was undertaken as an assessment of soil salinity for the Croobyar Road site is required in accordance with Section 18 of the Planning Secretary's Environmental Assessment Requirements for the development *"Provide: an assessment of salinity, including a salinity management plan where relevant"* and to assist in planning and design of the development.

DP (2021) comprised the drilling of boreholes with in-situ testing and sampling followed by laboratory testing of selected samples, analysis and reporting.

A "worst case" scenario was used to classify the extent of salinity and aggressivity of the site materials below the current ground surface to the depth of investigation. The "worst case" classification was carried out by utilising a maxima / minima analysis within the full investigated depth zone of 0 up to a maximum of 5.5 m at individual locations.

Based on the results of DP (2021) (and the worst-case pH results for each borehole) the site is classified as 'mildly aggressive to concrete' foundations and piles. It is noted that if any excavation is proposed below depths of 1.5 m in the vicinity of Borehole 101, a review of this classification will be required.

Based on the results of DP (2021), the entire site is underlain by soils which are classified as 'non-aggressive to steel'.

Based on the results of DP (2021), the soils underlying the site are classified as 'non-saline to slightly saline'.

DP (2021) concluded that the mild aggressivity to concrete, presence of some slightly saline soils and the highly sodic soils are naturally occurring features of the local landscape and are not considered impediments to the proposed development.

Based on the results of DP (2021), the site specific management of saline soils was not considered to be required.

3. Site Description

The site, which forms part of Lot 200 in Deposited Plan 1192140 is an irregular shaped area of approximately 2.4 hectares with maximum north-south and east-west dimensions of 150 m and 160 m respectively (refer Drawing 1 in Appendix B). It is bounded to the west by Lot 1 in Deposited Plan 811690, to the north by a sewer pumping station and Croobyar Road, to the east by existing low-density residential development with Princes Highway beyond, and to the south by the remainder of the former grounds of the Shoalhaven Anglican College. Surface levels generally fall in the westerly direction at grades of 1 in 20 to 1 in 90 with some near level terraces associated with the existing school infrastructure. The overall difference in levels across the site is estimated to be about 8 m from the highest part of the site (north-eastern part) to the lowest (south-western part).

At the time of the investigation, single storey buildings associated with the former school were located in the northern and southern sections of the site (refer Drawing 1). A north to south trending drainage depression was located along the western boundary. Stands of trees were noted along the eastern and western boundaries and sporadically throughout the remainder of the site. An existing netball / basketball playing surface was located in the western part of the site. Other parts of the site were typically lightly grassed / landscaped (near existing buildings) or asphalt sealed (car parks and driveways). A sewer main diagonally crosses the site (refer Drawing 1).

4. Published Data

4.1 Soil Landscape

The site is not covered by the NSW Soil Landscape Mapping, however, reference to the Great Soil Groups land and soil map indicates that the site is underlain by Kurosol Soils (Soil Unit KU) of Regolith Stability Class R1. These soils are characterised by brown podzolic, typically residual soils of low erodibility and relatively high sodicity. The soils are typically moderately to highly reactive with impermeable, highly plastic, highly organic subsoil.

4.2 Geology

Reference to web-based mapping indicates that the site is underlain by Milton Monzonite (a medium to coarse grained igneous rock) of Mesozoic age. The results of the field work were consistent with the broad-scale geological mapping with monzonite intersected in the six of the eight previous DP boreholes that intersected bedrock.

4.3 Hydrogeology

Given the general topography of the site, groundwater and surface water are expected to flow towards the west and south respectively. There is a small marshy wetland located in the western part of the site, however the nearest permanent water body is a farm dam on Pettys Creek, a perennial watercourse located about 650 m south-west of the site. A tributary of Pettys Creek is also present on the western site boundary.

A site walkover to observe the condition of the tributary was undertaken on 11 February 2020. The tributary was densely overgrown with apparently healthy vegetation. The dense vegetation prevented a visual inspection to establish the presence or quality of water.

The localised groundwater flow is anticipated to follow the site's topography in a westerly direction towards the tributary. Regional groundwater is anticipated to flow in a generally easterly direction towards the Tasman Sea, located approximately 3.5 km to the east of the site.

A search of the Water NSW publicly available registered groundwater bore database indicated that there are no registered groundwater bores within 500 m of the site. The closest registered groundwater bore to the site, bore GW031037, is located approximately 1 km to the east of the site. This bore has an indicated domestic / stock purpose and an indicated depth of 60 m. No information on the standing water level was recorded for this bore.

4.4 Acid Sulfate Soils

The NSW Acid Sulfate Soil Risk Map indicates that the site is in an area of *"no known occurrence of acid sulfate materials"* and is about 580 m from the nearest mapped area, which is identified as having a *"low probably of occurrence of acid sulfate materials (Lap2)".* These low probability areas are noted as *"generally not expected to contain ASS materials, although highly localised occurrences may occur especially near boundaries with environments with a high probability of ASS occurrence".*

4.5 Salinity

The National Land and Water Resources Audit, *Dryland Salinity National Assessment* indicates that the occurrence of saline soils is unlikely at the site. A walkover of the site by an experienced geotechnical engineer indicated there were no visible signs of shallow saline soils.

5. Proposed Development

It is understood that the development is still in a conceptual planning and design phase and as such, design details are yet to be provided. Based on the preliminary masterplans provided by the client, the proposed development will comprise the demolition of some existing buildings, followed by the construction of up to seven, single storey school buildings including new car parks and pavement areas. Proposed building locations and car park / pavement areas are shown on Drawing 1 in Appendix B. An additional revised master plan was provided to DP by S.J.A Construction Services Pty Ltd. As requested, the revised master plan has been included in Appendix B of this report.

Although design details are yet to be finalised, bulk earthworks are expected to be minimal, with finished levels expected to be close to existing levels. Excavation depths of up to about 1 m are anticipated for removal of existing buildings and foundations, the construction of new foundations and the installation of services. As the design is in a preliminary planning phase, no loading information has been provided by the client. However, based on the expected single storey masonry construction, design loads are expected to be commensurate with typical residential construction.

6. Comments

6.1 Potential Impacts of the Development

Based on the observed groundwater levels and the proposed design, groundwater interaction during the proposed works is not anticipated. It is noted that groundwater levels can fluctuate, though it is unlikely that such fluctuation would cause interaction with the proposed works. As such, the proposed excavations are considered to have a minimal, if any, impact on the local groundwater regime.

If the proposed design is amended resulting in greater depths of excavation than currently proposed, it is considered that a review of the revised design and potentially revision of this report would be required.

It is noted that the proposed development may result in an increase in impermeable surfaces (i.e. roads roofs, etc. However, given the relatively minor footprint of the proposed development the net effect is likely to be minimal.

In summary, the effects of the development on the local groundwater regime are considered to be minimal and no on-going groundwater monitoring is considered to be required.

The anticipated works associated with the proposed development would necessarily disturb the surface soils at the site and temporarily increase the likelihood of impacts to the adjacent tributary and associated riparian area. The potential impacts are associated with increased traffic during works, spoil generation and management, sewage and stormwater control vehicle and plant emissions, erosion and sediment control, waste management requirements.

The potential impacts associated with the above are considered typical with development works of this nature and able to be readily minimised and managed.

6.2 Measures and Procedures to Minimise and Manage Potential Impacts

It is proposed that the potential impacts of the development be managed via environmental management procedures and control plans. Such procedures and plans are considered typical for a development of this nature.

The proposed Environmental Management Plan (EMP) to minimise and manage potential impacts is presented in Section 7 of this document.

7. Environmental Management Plan Procedures and Control Plan

This section outlines the EMP procedures recommended to be implemented during the works. Under this plan, sub-plans have been developed where an environmental aspect or issue requires complex and detailed environmental management.

The overall objectives of the EMP procedures and control plans are to:

- Comply with published relevant statutory requirements, environmental standards and available best practice guidelines;
- Minimise the potential environmental impacts of the proposed works; and
- Provide guidance to control the work health and safety hazards associated with the bulk earthworks.

7.1 Site Security

The site should be secured during earthworks to prevent incidents involving persons not permitted to access the site. The following site security measures should be enforced at the site.

Table 1: Site Security Measures

Item	Control Measures
1	The site shall be fenced (by a 1.8 m high wire mesh fence or equivalent) and the fence should be maintained around the site. Any breakages in the fence are to be repaired immediately to prevent unauthorised access to the site.
2	Site entrance / exit points should be limited and clearly identified. All site access points should be manned during working hours and secured and locked when the site is not supervised.
3	Site access should be restricted during site development works to persons with a legitimate reason to enter the site.
4	A record of all persons entering the site should be maintained. All persons entering the site should be supervised / inducted as appropriate, report to the Contractor's site manager and sign in and out.

7.2 Traffic Management Plan

A Traffic Management Plan should be prepared and implemented by the Contractor with the aim of reducing the anticipated environmental impacts upon the existing traffic levels and systems within the project site. The following are proposed additional mechanisms in order to strengthen the procedure and controls to manage the impact of traffic to and from the site.

Table 2: Traffic Environmental Control Measures

Item	Control Measures
1	Road, traffic and site signage on the main road entrance / exits to the site should be erected and maintained, particularly where both private and commercial vehicles are in operation. This should be established with particular commitment to areas that will receive high volumes of traffic both on and off-site, for example the site entrance, parking and turning areas.
2	Traffic control devices should be installed as appropriate to warn, instruct and guide road users safely through and around the site.
3	Containment fences (such as plastic mesh fencing) should be used to provide visible separation to pedestrian and vehicular traffic where required. If additional protection for pedestrians is warranted, safety barriers should be installed to separate pedestrian and vehicular traffic. Other devises that may be required on the site include cones, flaps, temporary pavement markings and boom gates.
4	Signs directing traffic should be erected before work begins and must be clearly visible – not obstructed by vegetation or plant etc.
5	Heavy traffic movement should be restricted on and off site, where possible, to the hours as specified in the approval for the works. When the movement of heavy vehicles outside of these hours cannot be restricted, documentation should be maintained to justify out of hours work (e.g. floating of equipment in accordance with any Roads and Maritime Services (RMS) restrictions).
6	All soil loads of shall be tarpaulin covered and lightly wetted to minimise materials or dust dropping or being deposited outside or within the site.
7	In accordance with the Air Quality Control Plan, vehicles transporting material to and from the construction site should be covered immediately after loading (prior to traversing public roads) to prevent windblown dust emissions and spillages.
8	All vehicular traffic should use only routes approved by the Council to and from any selected landfill if offsite disposal is to occur.
9	Vehicle and machinery movements during the construction works should be restricted to designated areas on the site and should be undertaken in accordance with the site's Traffic Management Plan
10	Adequate off-road parking should be provided for construction vehicles and construction workforce.
11	Adequate room should be provided for vehicles to manoeuvre on the site.
12	All trucks on site should have fitted, and maintain, reversing lights and reversing alarms.

7.3 Monitoring of Truck Loads Entering and Exiting the Site

A daily record should be maintained of trucks entering and exiting the site and is the responsibility of the Contractor. The records shall include the registration number, company, time entering / leaving, load details and source or destination (as appropriate). The record should also report daily logs of truck movements, daily progress, abnormal occurrences, incidents, load characteristics and landfill weighbridge disposal dockets.

Landfill weighbridge disposal dockets will need to be obtained and provided to the Contractor for correlation with the site records.

7.4 Spoil Management Plan

The works shall include the excavation and placement of spoil. To minimise the environmental effects of these movements, the management measures summarised in Table 3 should be undertaken by the contractor.

Table 3: Spoil Management Measures

Item	Control Measures
1	Ensure all environmental control measures are in place prior to spoil excavation and are applied to any stockpiled materials.
2	Stockpiles of sand, gravel, soil and the like must be located such that the material does not spill onto the road pavement and is not placed in drainage lines or watercourses and cannot be washed into these areas.
3	Any materials that require off-site disposal should be classified in accordance with the NSW Environment Protection Authority (EPA) waste classification guidelines and disposed of to an appropriate landfill. Disposal dockets should be retained and a copy provided to the client.
4	Construct stockpiles, preferably with no slope greater than 2:1 (horizontal to vertical) to manage dust generation and erosion. A less steep slope may be required once the surrounding area is flattened to reduce dust emission
5	Apply periodic dampening, where necessary, to suppress dust from being released.
6	Stockpiled materials must have a sediment control fence.
7	Materials should be managed through procurement processing such that only the necessary stockpile material for the project is stored on site.
8	Any identified contaminated material must be managed in accordance with an environmental consultant's requirements
9	Any areas where contaminated material has been stockpiled shall be required to be validated accordingly as specified by the appointed environmental consultant after the stockpiles have been removed

7.5 Groundwater, Sewage and Stormwater Control Plan

Further to the provisions of the site's stormwater, sewer concept and sediment control plan the measures summarised in Table 4 should be undertaken by the contractor.

Table 4: Control Measures to Reduce Groundwater, Sewage and Stormwater Impacts

Item	Control Measures
1	Any water that exhibits any potential contamination (visual or olfactory) must not be discharged into the stormwater system
2	Sewage must be discharged to the sewer or disposed off-site by an appropriate contractor
3	Any waters discharged to stormwater must meet Council and POEO Act requirements

7.6 Air Quality Control Plan

The main objective of this air quality control sub-plan is to control the above identified air emission sources and to protect the local air quality. This can be achieved through the implementation of various control mechanisms detailed below.

7.6.1 Vehicles and Plant Emissions

To reduce air emissions created by the use of vehicles and other similar equipment that generate air emissions, the contractor is recommended to implement a set of procedures and controls measures as detailed in Table 5.

Table 5: Control Measures to Reduce Vehicle Exhaust & Plant Emissions

Item	Control Measures
1	All vehicles and machinery should use clean fuels (e.g. low sulphur content) as accessible, fitted with appropriate emission control equipment, maintained frequently and serviced to manufacturer's specifications.
2	Heavy equipment is to be serviced and any emissions filters or catalytic converters (in the case of petrol engines), if any are to be tested for integrity. If the filters or catalytic converters are defective, replacement should be made prior to equipment use on site.
3	Only machinery that complies with the appropriate emission standards should be permitted for use on site (emissions to be checked by visual inspection and recorded).
4	Plant and equipment not in use shall be switched off to avoid idling and reduce air emissions.
5	Sub-contractors and service providers used by the contractor should also ensure that the equipment used complies with the requirements within the control plan above.

7.6.2 Dust Emissions

Dust emissions may be produced daily during the proposed works through earthworks, movement of vehicles and transport of spoil and the potential wind erosion of exposed areas and/or stockpiles.

The generation of dust has the potential to cause nuisance to those exposed. To reduce the production of dust during the proposed works, the contractor is recommended to implement the procedures and control measures detailed in Table 6.

Table 6: Control Measures to Reduce Dust Levels

Item	Control Measures
1	The proposed earthworks should be conducted in stages.
2	Use of water or similar (e.g. spray grass or hydromulch as applicable) as dust suppressant in haul routes, excavation areas, and stockpiles.
3	When conditions are excessively windy and the dust emissions criteria from operations cannot be maintained, then all dust generating activities shall cease until dust suppression can be adequately carried out and dust levels at the site boundaries are acceptable. Similarly, work should cease during heavy rain periods.
4	Excavated material to be slightly watered before being transported.
5	Provision of wet dust suppression during loading of trucks in instances of potential high dust conditions.
6	Each truck, prior to exiting the site, shall be inspected prior to despatch and either logged out as clean (wheels and chassis) or hosed down into the wheel wash or wash down bay until designated as clean.
7	Cover vehicles carrying earth materials and other wastes, especially on public highways.
8	For haul roads and other un-surfaced areas of the site that are not watered, restrict vehicle speeds to 10 km/h.
9	Minimise traffic by properly scheduling materials delivery and excavation hauling to avoid peak traffic hours.
10	Access roads and loading areas should remain on constructed hard stand for the duration of the project to prevent the tracking of mud / dirt onto public roads.
11	Cleaning of roads (as needed) and ensuring access ways are stabilised to be free of loose soils.
12	Stockpiles to be temporarily covered (e.g. by tarpaulin, polythene or geotextile membranes) and stabilised or sprayed with water to minimise dust generation.
13	Silt and other materials should be removed from around the sediment and erosion control structures (e.g. sediment traps) to ensure deposits do not become a dust source.

7.7 Erosion and Sediment Control Plan

Further to the site's erosion and sediment control plan, the measures as described in Table 7 should be undertaken by the contractor.

Table 7: Control Measures to Reduce Erosion and Sedimentation Impacts

Item	Control Measures
1	The site must be enclosed with a suitable security fence to minimise disturbance by preventing vehicular and pedestrian access to restricted areas.
2	Erosion and sediment control devices should be installed prior to the commencement of bulk earthworks.
3	Erosion and sediment control devices should be maintained throughout the entire duration of the works and for a minimum of three-month period after the completion of the project, where necessary.
4	Sediment traps must be installed on site around all affected stormwater inlets and drainage lines in accordance with Council guidelines.
5	All sediment traps must be maintained until the site has been rehabilitated (i.e. turf installed, or grass cover established)
6	All ingress / egress access ways should be effectively stabilised, e.g. use of wash down facilities for vehicle tyres or shaker pads, so that the erosion hazards are reduced and soil materials are unlikely to be tracked onto public roads.
7	Whenever possible, construction works should not be scheduled when there is a significant potential for rainfall and during heavy storm events.
8	Street sweeping should be undertaken as required.

7.8 Waste Management and Re-Use Plan

The quantities of waste requiring off-site disposal arising from the works are expected to be relatively modest and should not present any particular problems. All wastes generated from site activities should be properly segregated according to the waste type and adequate on-site storage arrangements provided.

In keeping with the principles of sustainability, initiatives and designated storage containers / areas should be introduced to maximise the reuse and recycling of all wastes generated during the works. Training shall be provided for workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.

Management measures to reduce wastes shall generally follow the principles of the waste minimisation hierarchy that is (in order of preference):

- Avoid waste at the source;
- Reduce - Monitoring the purchasing and returning of excessive packaging;
- Reuse - Provide goods for reuse on site or another site;

- Recycle - Send on to a recyclers for remanufacture as another product; and
- Dispose - As a last option, waste may be sent to landfill including all putrescible wastes. Contaminated wastes should be treated by an authorised disposal facility.

Table 8 lists the control measures to manage solid waste arising from the construction activity.

Table 8: Control Measures to Manage Solid Waste

Item	Control Measures
1	Robust construction bins or stockpiles shall be used for the collection of major recyclables such as concrete, bricks, steel and timber.
2	Install on-site waste receptacles, such as skips or bins, and wind-proof litter receptacles etc.
3	A program for regular collection / removal or emptying of bins or skips should be implemented.
4	Any temporary stockpiles of waste shall be appropriately contained / bunded within the site and dust mitigation measures used when required.
5	All litter should be confined and controlled within the site boundaries by means of adequate site housekeeping.
6	Signs should be erected within the construction site to encourage the reuse and recycling of recovered waste material.
7	Where possible, reuse and recycling recovered waste material should be undertaken on site.
8	Where the recyclable materials cannot be used on site they may be sold, exchanged or given away for off-site use.
9	Aim to accurately estimate and order the quantities of materials required to avoid waste.
10	Any wastes that cannot be reused or recycled should be disposed of in accordance with the EPA waste classification guidelines and disposed of to an appropriate landfill.
11	No sewage, wastewater or effluent containing sand, cement, silt or any other suspended or dissolved materials or wastes should be permitted to flow from the site into the surface waters. Regular and proper removal of such wastes containing liquid or solid wastes by mechanical devices or management practices should be arranged.
12	Associated controls relating to sedimentation, run-off, accidental spillage and waste management should be strictly observed and adhered to in the handling of the excavated materials, whether clean or contaminated.

7.9 Imported Fill

Any importation of fill material onto the site should not cause additional contamination to the site and therefore all material imported to the site should be suitable for the proposed site use. Table 9 summarises the procedures for the importation of fill to the site, if required.

Table 9: Control Measures for the Importation of Filling

Item	Control Measures
1	Each truck load of imported fill should be recorded in accordance with the control measures provided in Section 8.3.
2	No fill shall be accepted onto the site without copies of appropriate paperwork submitted indicating the source and nature of the fill. The paperwork should be prepared by a suitably qualified consultant and indicate if the material can legally be accepted at the site (e.g. VENM, excavated natural material (ENM), coal washery rejects as defined under the POEO Regulation) and that the material is suitable for the proposed site use and poses no unacceptable risks to site users and the environment. No contaminated or waste material (excluding waste materials meeting the relevant Resource Recovery Exemption requirements for reuse under the POEO Act) is to be imported to the site. All requirements of the EPA and Council will need to be met for any and all fill materials imported onto the site.
3	All imported fill is to be geotechnically suitable for its proposed use and placement of fill should be supervised for geotechnical purposes. All fill must be placed and compacted in accordance with the requirements of Australian Standards. No fill shall be imported to the site prior to receipt of a written approval from the superintendent. All fill sources other than quarry products must be inspected and approved by the site's environmental consultant prior to the issuing of an approval. All chemical and geotechnical sampling and test data must be reviewed and approved by the site's appointed environmental consultant prior to the issuing of an approval.
4	Fill locations should be recorded and be able to be linked with the paperwork submitted upon entering the site.
5	Any fill that is imported to the site and does not meet these control measures should be removed from the site and replaced with suitable material.

7.10 Chemical Storage and Management Plan

The proper storage and transportation of fuels and chemicals (paints, oils, etc.) at the site is vital to the prevention of soil, groundwater and surface water contamination as a result of spillages and leakages.

Table 10 provides the procedures for transportation, storage and management of fuels, and chemicals.

Table 10: Control Measures for Material Storage and Transportation

Item	Control Measures
1	Any on-site servicing, refuelling, waste disposal and storage areas should be placed as far as possible from creeks and / or drainage channels to reduce potential of surface water contamination via spillage, run-off or windblown debris.
2	Maintenance of oil leaks and servicing of operational fluid to take place prior to equipment arrival on site. This should avoid project downtime and the possibility of unscheduled servicing of machinery in undesignated areas.
3	Vehicles and mobile equipment to be regularly inspected and maintained to confirm that they are not leaking or dripping. Operators should also be instructed to notify their supervisors if there are any problems with their vehicles. Spill kits should be readily available.
4	All minor or emergency servicing that cannot be carried out off-site should be carried out at a dedicated sealed, impermeable, drained and kerbed concrete floor with wastewater and hydrocarbon / solvent collection and separation facilities. Machinery that has broken down may be required to be towed to the servicing area.
5	Refuelling (if done on site) should only be carried out in designated areas following specified procedures, not at machinery work locations, to reduce potential spillages. A dedicated refuelling area near to the servicing area should be established. Refuelling areas should be communicated to all site personnel by signs and notice boards. The refuelling area should be sealed with a floor drain installed to contain any spills that may occur.
6	Machinery to be washed / degreased prior to arrival at the site, as practicable.
7	Hazardous materials (if any) only to be handled by operators trained in spill response procedures.
8	Any spillage or leakage and resultant contaminated soil (if any) to be removed and disposed of using approved waste management providers as soon as practicable.
9	Waste fuel / oil to be removed and transferred to recycling facilities as practicable.

7.11 Contingency Plan

This contingency plan has been devised to cover specific environmental situations as follows:

- Unexpected finds in soil during site clearing, excavation or construction phases of the development; and
- Wastewater disposal.

The objectives of the contingency plan are to:

- Ensure that environmental considerations are addressed in the handling of emergencies by the contractor;
- Minimise the impact on the environment from any unexpected situations; and
- Provide a guideline for a quick and effective response to environmental incidents in the advent of an emergency.

7.11.1 Soil Contingency Plan

Should unexpected occurrences be identified during bulk earthworks (such as unidentified stockpiles, buried tanks or other contaminants), the following general approach should be adopted:

- Notify the site's environmental consultant for an assessment of the severity of the occurrence in terms of the potential impact to human health and the environment;
- At the instruction of the site environmental management consultant, place barricades around the affected area and cease work in that area; and
- Notify the client of the occurrence.

Remediation may be required following the assessment by the site's environmental consultant; however, this will be dependent upon the type of unexpected occurrence and the severity of the potential impact. Additional measures recommended by the site's environmental consultant may require approval by Council prior to implementation.

During excavation of drums or other metal obstructions if encountered during remediation and / or building works, the site's environmental consultant should be notified prior to the obstruction being removed. The site's environmental consultant should inspect the obstructions and assess its contamination status prior to off-site removal.

7.11.2 Wastewater Contingency Plan

Any groundwater or surface water that has contacted contaminated soils during site works should be treated as contaminated (unless testing establishes otherwise) and cannot be directly disposed to stormwater or sewer without first being assessed.

Depending on the quality of the wastewater requiring disposal, disposal could be by one or more of the following options:

- Use on-site (e.g. for dust control);
- Treatment on-site (e.g. in a tank / pond set aside for pH / sediment treatment);
- Pump to stormwater;
- Pump to sewer; and
- Tanker off site for disposal at an aqueous treatment plant.

Further information on off-site disposal options are provided below.

Stormwater Disposal
Stormwater disposal is regulated by the local council. Under the requirements of the EPA, the water quality must be as per the guidelines provided in the *Protection of Environmental Operations Amendment Act*, 1997 (POEO Act).

If the water at any stage does not meet these guidelines, it must be stored on-site for treatment prior to subsequent off-site disposal. If the parameters of concern are readily adjustable (e.g. turbidity, pH), this may require a location where the water can be stored for sedimentation, flocculation, or pH correction (without mixing with leachate-contaminated waters).

Regular measurement of suspended solids and turbidity, as well as any other potential contaminants at the point of discharge would be required during disposal to stormwater to assess the levels and any requirement for additional settling of solids prior to discharge.

Sewer Disposal
Waters being disposed to sewer require a Trade Waste Agreement with Sydney Water as well as payment of a fee for the service, based on level of contaminants and disposal volumes. Analysis must be undertaken, and a flow meter installed at the discharge point. An advantage of sewer disposal is that higher levels of contaminants are allowed. Acceptable limits of contaminants for disposal to sewer can be obtained from Sydney Water.

Off-Site Disposal to Treatment Plant
This disposal option allows relatively quick disposal of wastewater and may be suitable for small volumes or water that, following analysis, is deemed unsuitable for disposal to stormwater or sewer or for on-site treatment. However, for large volumes of water this option may be relatively costly.

8. Closure

In summary, the effects of the development on the local groundwater regime are considered to be minimal and no on-going groundwater monitoring is considered to be required.

The anticipated works associated with the proposed development would necessarily disturb the surface soils at the site and temporarily increase the likelihood of impacts to the adjacent tributary and associated riparian area. The potential impacts are associated with increased traffic during works, spoil generation and management, sewage and stormwater control vehicle and plant emissions, erosion and sediment control, waste management requirements.

It is proposed that the potential impacts of the development be managed via an EMP. Such procedures and plans are considered typical for a development of this nature.

9. References

Cardno. (2020). *Preliminary Site Investigation and Limited Soil Assessment, Budawang SSP, Milton.* Cardno (NSW/ACT) Pty Ltd.

CRC CARE. (2017). *Risk-based Management and Remediation Guidance for Benzo(a)pyrene.* Technical Report no. 39: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

DP. (2018). *Report on Preliminary Site Investigation for Contaminated Land, Proposed Seniors Living Development, 17 Croobyar Road, Milton.* Douglas Partners Pty Ltd.

DP. (2020). *Report on Geotechnical Investigation, Proposed Budawang SSP Relocation 17 Croobyar Road, Milton.* Douglas Partners Pty Ltd.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM].* Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (1995). *Contaminated Sites, Sampling Design Guidelines.* NSW Environment Protection Authority.

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

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land.* Contaminated Land Guidelines: NSW Environment Protection Authority.

10. Limitations

Douglas Partners (DP) Pty Ltd has prepared this report for this proposed Budawang School relocation project at 17 Croobyar Road, Milton in accordance with DP's variation letter WOL200347 Variation 3 dated 10 December 2020 and acceptance received from Ms Samata Piatek of S.J.A Construction Services Pty Ltd dated 25 January 2021. The work was carried out under a modified SINSW consultancy agreement (*SINSW00964/20 Budawang SSP Geotech Consultancy* dated 28 September 2020. This report is provided for the exclusive use of School Infrastructure New South Wales (SINSW) 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 discussed 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 this assessment and during previous investigations. 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.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

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.

Douglas Partners Pty Ltd

Appendix A

About This Report

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

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.

Appendix B

Drawing 1
Master Plan, Project 190941, Drawing No. SSDA-2000 Issue D

CROOBYAR ROAD

Block D, Hydrotherapy Unit

Block A1

Block A2

Block B, 3 Homebases

Block C, 4 Homebases

Existing School

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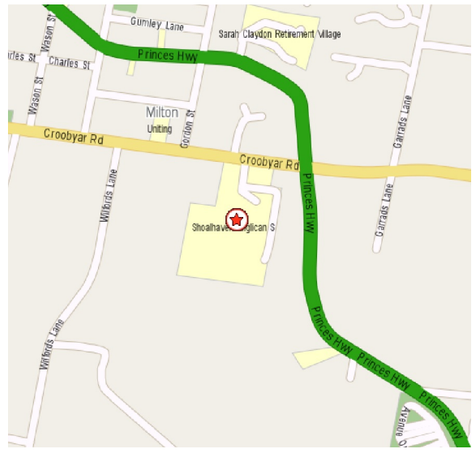


Locality Plan

Legend

- Lot Boundary (Approx.)
- Proposed Pavement Area (T.B.C)
- Proposed Building (T.B.C)
- Approximate Proposed Development Boundary (T.B.C)
- Approximate Location of Existing Sewer Main

0 10 20 30 40 50 m

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT:	School Infrastructure NSW (SINSW) Pty Ltd	TITLE:	**Site Location and Features**
OFFICE:	Wollongong	DRAWN BY:	KGH		**Proposed Budawang School Relocation**
SCALE:	1:700 @ A3	DATE:	23/04/2021		**17 Croobyar Road, Milton**

N

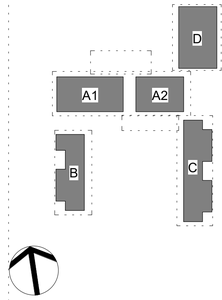
PROJECT No:	89390.04
DRAWING No:	1
REVISION:	3

SITE PLAN LEGEND

- NEW LANDSCAPE
- NEW PATHWAYS
- NEW BUILDINGS
- ROADS
- PARKING SPACES
- BUDAWANG SCHOOL BOUNDARY
- EXISTING SEWERLINE
- EXISTING TREES
- PROPOSED TREES
- BOUNDARY TREES
- DOE OWNERSHIP
- LP LIGHT POLE

Amendments

Issue	Description	Date
A	ISSUE FOR INFORMATION	12/03/2021
B	ISSUE FOR INFORMATION	23/03/2021
C	ISSUE FOR INFORMATION	25/03/2021
D	ISSUE FOR SSDA	08/04/2021



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architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title

BUDAWANG SCHOOL

Drawing Title

SITE PLAN

Scale	1 : 250
Drawing Created (date)	02/24/21
Drawing Created (by)	TKD
Plotted and checked by	RF
Verified	RF
Approved	RK

Project No	Drawing No	Issue
190941	SSDA-2000	D

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