Kogarah War Memorial Pool

Civil Engineering and Stormwater Management Report

Prepared for SJB Architects

11 September 2020

Document Information

Prepared by
Enspire Solutions Pty Ltd
205 / 275 Alfred Street North
North Sydney NSW 2060
ABN 71 624 801 690

Document Title	**Kogarah War Memorial Pool**
Document Subject	Civil Engineering and Stormwater Management Report
Prepared For	SJB Architects
Project Name	Kogarah War Memorial Pool Carss Park
Project Number	200060
File Name	rept001-200060-01-enspire-r03-200911-civilengineering

Transmittal

Revision	Date	Prepared by	Checked by	Approved by
A	09/09/2020	A.Dawes		A.Dawes
		Issued For Approval		
B	10/09/2020	A.Dawes		A.Dawes
		Issued For Approval		
C	11/09/2020	A.Dawes	M.Hodges	A.Dawes
		Issued For Approval		

Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

Enspire Solutions (**Enspire**) has been engaged by SJB Architects (**SJB**) to prepare the Civil Engineering and stormwater management design and documentation in support of a Development Application (**DA**) submission to Georges River Council for the proposed demolition, remediation and landscaping of the existing Kogarah War Memorial Pool at Carss Park as shown in **Figure 1**.

Works associated with this application include:

1. Implementation of erosion and sediment controls
2. Bulk earthworks and capping
3. Stormwater management

Figure 1 –Site Plan

A preliminary Cost Estimate for the earthworks has been provided in Appendix A.

2 Related Reports and Documents

This report is to be read in conjunction with the following reports and documents:

1) Development Application Documentation prepared by Enspire:

Table 1 - Drawing Reference

Drawing Number	Drawing Title
200060-DA-C1.01	COVER SHEET AND DRAWING SCHEDULE
200060-DA-C1.21	GENERAL ARRANGEMENT PLAN
200060-DA-C3.01	EROSION AND SEDIMENTATION CONTROL PLAN
200060-DA-C3.21	EROSION AND SEDIMENTATION CONTROL DETAILS
200060-DA-C4.01	CUT AND FILL PLAN
200060-DA-C4.10	REMEDIATION PLAN
200060-DA-C5.01	SITEWORKS AND STORMWATER DRAINAGE PLAN – SHEET 02
200060-DA-C9.01	SITE SECTIONS

- Geotechnical Investigation – 99751.01 – prepared by Douglas Partners, August 2020
- Arboricultural Development Assessment Report, prepared by Moore Trees Arboricultural Services, August 2020

3 The Development

3.1 Existing Site Conditions

The site currently contains a dilapidated Olympic pool, children's pool, facilities building, associated seating, paths and other structures.

To the east and north of the pool complex is an existing landscaped mound.

The carpark located to the east of the pool complex is to remain.

3.2 Proposed Development Works

The development includes the following works:

- Demolition of the facilities building and other above ground structures
- Demolition of the pool
- Stripping and removal of topsoil (approx. 150mm)
- Removal of trees (refer arborist report)
- Excavation to achieve the proposed surface levels
- Extra over excavation to remove a further 500-1000mm
- Filling of the pool and site to provide a permanent capping
- Turfing of the remediated area
- Landscaping works

4 Erosion and Sediment Control

The objectives of the erosion and sediment control for the development site are to ensure:

- Adequate erosion and sediment control measures are applied prior to the commencement of construction and are maintained throughout construction
- Construction site runoff is appropriately treated in accordance with Georges River Council requirements

The erosion and sedimentation control will be constructed in accordance with Council requirements and the NSW Department of Housing Manual, “Managing Urban Stormwater Soil & Construction” 2004 (Blue Book) prior to any earthworks commencing on site.

4.1 Sediment and Erosion Control Measures

Prior to any earthworks commencing on site, sediment and erosion control measure shall be implemented by the contractor generally in accordance with the approved drawings. The measures shown on the development application drawings are intended to be a minimum treatment only as the contractor will be required to modify and stage the erosion and sedimentation control measures to suit the construction program, sequencing and techniques. These measures will include:

- A temporary site security/safety fence is to be constructed around the site
- Stabilised site access at the construction vehicle entry/exits
- Sediment fencing provided downstream of disturbed areas, including any stockpiles
- Dust control measures including covering stockpiles, installing fence hessian and watering exposed areas
- Placement of mesh and gravel inlet filters around and along proposed catch drains and around stormwater inlets pits

Any stockpiled material shall be located as far away as possible from any associated natural watercourses or temporary overland flow paths. Sediment fences shall be installed to the downstream side of stockpiles and any embankment formation.

During construction, sediment will be prevented from entering Kogarah Bay to the east by the following measures:

- A sediment fence is to be constructed around the perimeter of the site
- Maintain a mound/berm (150-300mm high) along the eastern edge of works for the majority of construction
- As the works involve excavation from the existing, all sediment laden runoff will be contained within the “excavation zone”
- A “basin” shall be provided within the excavation and should significant runoff be collected. The basin shall be managed in accordance with the bluebook including flocculation and / or pumping through a filter prior to discharge to the stormwater system within the carpark

5 Bulk Earthworks

5.1 Cut and Fill Operations

Post demolition of the pool complex, excavation is required to the site to allow for a capping over the existing contaminated subgrade and meet the proposed levels. The proposed levels have been designed to generally fall in a north-easterly direction from the existing carpark to the west and the southern row of trees, to the existing footpath to the north and landscaped batter in the east.

The capping has been designed in accordance with the recommendations from the Geotechnical Investigation – 99751.01 – prepared by Douglas Partners, August 2020.

The earthworks methodology is outlined below:

1. Strip existing vegetation and remove topsoil
2. Excavate to 500mm below the proposed surface levels
3. Excavate the 1000mm deep tree pits
4. Fill pool excavation with clean material to 500mm below the proposed surface level
5. Cover the site with a Geotextile fabric
6. Fill site with clean material
    a. General areas: 350mm fill and 150mm topsoil
    b. Tree pits: 850mm fill and 150mm topsoil
    c. With TPZ: 100mm fill and 200mm mulch
8. Turf and landscape site

Approximate cut to fill earthworks operations for the works are summarised in Table 2.

Table 2 - Approximate Cut and Fill Volumes

Earthworks	Volume (m^3)
Topsoil to be removed from site	867 (export)
Cut to be removed from site	6,693 (export)
Topsoil to be places	1,308 (import)
Clean Fill to pool (to capping level)	455 (Import)
Clean sill for capping layer	3,621 (Import)

The cut and fill earthworks volumes provided are concept only and are subject to change pending final coordination and detailed civil design. It should be noted the cut and fill operations for each stage will be calculated based on the following assumptions:

- No allowance for earthworks bulking factors
- Assume 150mm topsoil removal and replacement

5.2 Removal of Topsoil

Remove topsoil from areas to be cut, areas to be filled, areas under embankments and areas to be occupied by structures to a depth as directed by the Geotechnical Engineer (approximately 150mm).

After removing the topsoil, determine the surface levels in each cutting and embankment at sufficient locations to determine the volume of excavation for general earthworks and the volume of unsuitable material.

5.3 Excavation

Excavate over the site to produce levels and profiles as shown on the Drawings. Make allowance for compaction or settlement.

Excavated material must be transported to an approved tipping facility under EPA guidelines.

5.3.1 Subgrades Affected by Moisture

Where the subgrade is unable to support construction equipment, or it is not possible to achieve compaction because of high moisture content, perform one or more of the following:

1) Allow the subgrade to dry until it will support equipment and allow compaction.
2) Scarify the subgrade, work as necessary to accelerate drying, and recompact when the moisture content is satisfactory.
3) Excavate the wet material and remove to spoil and backfill excavated areas with compacted selected fill.

5.3.2 Subgrades Affected by Poor Compaction

Where the subgrade is unable to support construction equipment, or it is not possible to achieve compaction due to a loose or poorly compacted subgrade perform one or more of the following:

1) Re-compact the subgrade using appropriate compaction equipment recommended by the geotechnical engineer (including impact roller if recommended).
2) Excavate the loose or poorly compacted material to depths specified by the geotechnical engineer, remove to spoil and backfill excavated areas with compacted selected fill.

5.4 Placing and Compaction

5.4.1 Fill Materials

- All fill material shall be inorganic, non-perishable material
- Selected fill material shall be clayey soils with low to medium plasticity or well-graded crushed sandstone
- Maximum fill fragment size of 100 mm after compaction
- Fill material must come form a NATA tested stockpile

5.4.1.1 Excluded materials:

- Organic soils
- Contaminated materials
- Materials which contain substances which can be dissolved or leached out, or which undergo volume change or loss of strength when disturbed and exposed to moisture
- Silts or silt-like materials
- Fill containing wood, metal, plastic, boulders or other deleterious material

5.4.2 Preparation for Filling

Prepare the subgrade before placing fill. Shape to assist drainage. Remove materials which will inhibit or prevent satisfactory placement of fill layers, loose material, debris and organic matter. Compact the surface exposed after stripping in accordance with Clause 5.4.4.1. If necessary, loosen the ground to a depth > 200 mm and adjust the moisture content before compaction in accordance with Clause 5.4.4.1. Prior to placing fill materials the subgrade must be tested and presented for inspection by the Principal's Representative.

Where unsuitable material is found, such material must be excavated to the extent directed by the Principal's Representative. Remove from the site any contaminated materials that cannot be treated and re-used within the Works or stockpiled on the site.

5.4.3 Placing Fill

Place and compact fill in near-horizontal layers of uniform thickness in accordance with Table 1 to the dimensions, levels, grades, and cross sections shown on the Drawings so that the surface is always self-draining. Compact each layer in accordance with Clause 5.4.4.1. The layer thickness after compaction must not be less than that shown in Table 3.

Table 3 - Placing and Compacting Fill

Location	Maximum Layer Thickness Prior to Compaction	Minimum Layer Thickness after Compaction
General Fill	300 mm	100 mm

5.4.4 Compaction Requirements for Fill and Subgrade

5.4.4.1 Density

Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation and to conform to Table 3.

Table 4 - Compaction Table

Location	Cohesive soils. Minimum dry density ratio (standard compaction) to AS 1289.5.4.1	Cohesionless soils. Minimum density index to AS 1289.5.6.1
Subgrade to 150 mm deep	100%	80%
General fill	95%	70%
Select Clay Fill	98%	Not applicable
Basin Clay Core Fill (Zone 1)	98-104%	Not applicable
Basin Embankment Fill (Zone 3)	98-104%	Not applicable
Fills to support minor loadings incl. floor loadings < 20 kPa and isolated pad or strip footings < 100 kPa.	98%	75%
Fill to support pavements **Top 500mm of Subgrade** **Fill below top 500mm of Subgrade**	 100% 95%	 80% 80%

5.4.4.2 Moisture Content

Adjust the moisture content of fill during compaction within the range of 0 - 2 % wet of the optimum moisture content determined by AS 1289.5.1.1 or AS 1289.5.2.1 as appropriate, in order to achieve the required density unless noted otherwise in Clause 4.4.1.

6 Stormwater Management Strategy

6.1 Proposed Stormwater Management Strategy

The stormwater management strategy is to utilise overland sheet flow over landscaping and turf area in lieu of a concentrated pit and pipe network.

This is consistent with the surrounding parkland areas which have minimal to no formalised stormwater drainage within the landscape and turf areas.

6.2 Stormwater Quantity Strategy

Due to the reduction of impervious area and proximity to Kogarah Bay, Georges River Council has confirmed that no On-site Stormwater Detention is required. The reduction in impervious area will result in a reduction in site runoff and peak discharge due to additional infiltration and slower runoff times.

6.3 Stormwater Quality Strategy

Due to the reduction of impervious area no formal water quality system is proposed. Rainfall on the site will either infiltrate, and therefore not require treatment, or discharge through grass and landscaping which in itself provides treatment. and is commonly referred to as of sediments and nutrients.

The Water Sensitive Urban Design Technical Guidelines for Western Sydney, prepared by the Upper Parramatta River Catchment Trust, outlines the use and treatment efficiency of grass buffer strips

3.3.2 Vegetated Filter Strips

Vegetated filter strips (or buffers) are broad, sloped open vegetated areas that accept shallow runoff from impermeable areas as distributed or sheet flow. They provide a number of functions including:

- removing sediments by filtration through the vegetation;
- reducing runoff volumes (by promoting some infiltration to the sub-soils); and
- delaying runoff peaks by reducing flow velocities.

Pollutant Trapping Efficiency

Typical pollutant removal efficiencies for vegetation filter strips are provided in the table below (source: WBM, 2003).

Gross Pollutants*	Coarse Sediment*	Medium Sediment	Fine Sediment	Free Oil and Grease	Nutrients	Metals
-	50 – 80%	30 – 50%	10 – 50%	10 – 50%	10 – 50%	10 – 50%

* Assumes gross pollutant pre-treatment provided.

Figure 2 – Water Sensitive Urban Design Technical Guidelines for Western Sydney – Buffer Strip

7 Conclusion

This report has been prepared to provide an understanding of the design assumptions, inputs and outcomes for the Civil Engineering and stormwater management aspects of the proposed development of the existing Kogarah War Memorial Pool complex.

The report outlines the following:

- Sediment and erosion can be provided to control sediment runoff during construction
- Earthworks operations can be undertaken to adjust finished surface levels and cap in-situ contaminated material
- Stormwater runoff can be managed through natural measures

Appendix A Cost Estimate

Stage 1

Revision: 1
Completed: A.Dawes
Checked: P.Matic

Item No.	Description of Work	Quantity	Unit	Unit Cost	Cost
1	**Earthworks**				
1.1	Topsoil soil strip and diposal	867	cum	$ 521.60	$ 452,227.20
1.2	Cut earthowrks material and disposed	6693	cum	$ 656.00	$ 4,390,608.00
1.3	Import topsoil to be placed	1308	cum	$ 3.00	$ 3,924.00
1.4	Import clean fill to pool	455	cum	$ 6.00	$ 2,730.00
1.5	Import clean fill for capping layer	3261	cum	$ 6.00	$ 19,566.00
				Subtotal	***$ 4,869,055.20***
2	**Landscaping**				
2.1	**Turf**	8720	sqm	$ 9.48	$ 82,665.60
				Subtotal	***$ 82,665.60***

Stage 1 Subtotal	**$ 4,951,720.80**
Contingency (5%)	**$ 247,586.04**
Stage 1 Total	**$ 5,199,306.84**