



SAFETY IN DESIGN REPORT

10 November 2023

Prepared for:
Western Parkland City Authority

Prepared by:
Pak Lau

Project Number:
304000968

Safety in Design Report

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Safety in Design Report

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Prepared by:

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1 Introduction

Stantec Australia Pty Ltd (Stantec) has been engaged by Western Parkland City Authority (WPCA) to design the trunk drainage network, including the wetlands and detention basins for the Bradfield City development.

This Safety in Design Report has been prepared in accordance with the requirements of the *Work Health and Safety Act 2011(NSW)* and the *Work Health and Safety Regulation Part 6.2 Clause 295*. Stantec understands that the proposed wetlands and ponds will be ultimately be owned and maintained by Sydney Water, therefore a workshop was undertaken on 25/10/2023 with Sydney Water and WPCA to review the risks and hazards identified in the safety and design risk register (refer to **Appendix A**). The purpose of this safety and design report is to inform the principal, contractor, sub-contractors, and end users of the proposed development of the perceived hazards and any risk control measures considered during design. The following assessment is therefore intended to identify possible risks during construction, future use, maintenance, and decommissioning of temporary works.

This report identifies potential hazards, assigns a risk rating, and records the design measures implemented to minimise risk for this specific project. Based on the control methods being implemented, a residual risk rating is consequently developed. The intent of the design control measures with respect to risk is to Eliminate, Reduce, Inform and Control. Any safety issues unresolved through design are also identified for their appropriate management. A copy of the Designer's Risk Assessment is included in **Appendix A**.

This design report assumes that during the construction, maintenance and demolition of the development, the Principal will engage experienced and competent personnel as part of the respective tender evaluation process. Regardless of the following identified hazards, risks and control measures in the design safety analysis, it is the Head Contractor's obligation to prepare and implement site specific safe work method statements for construction activities. This needs to be undertaken in accordance with the *Work Health and Safety Act 2011 (NSW)*.

The risks identified in this risk assessment are project and site-specific risks. These risks are not generic or common risks associated with construction works, rather they are risks which would not be easily recognized by a reasonably competent contractor. Other generic risks, which are typical to particular construction activities are to be identified and managed by the client and/or construction contractors.



2 General Description of Project

2.1 Client

The Client for the project is:

Western Parkland City Authority
50 Belmore Street Penrith NSW 2750
Contact: Dee Brock
Email: dee.brock@wpca.sydney
Tel: 0400 9999 40

2.2 Designer

The Designer is:

Stantec Australia Pty Ltd
Level 4, 88 Phillip Street, Parramatta, NSW 2150
Contact: Pak Lau
Email: pak.lau@stantec.com
Tel: 02 8448 1802

2.3 Construction

The Constructor or Principal Contractor is:

TBC

2.4 Nature of the Work

The scope of the main activities involved in these works are:

- Bulk earthworks;
- Stormwater quantity control (construction of a series of ponds with extended detention to attenuate flows and detain stormwater for reuse and the installation and design of splitter pits to direct flows from the development and external catchments into the appropriate treatment train);
- Stormwater quality/on site detention (OSD) (construction of a series of sediment basins and wetlands and the installation of gross pollutant traps);



- Associated stormwater pipes and infrastructure;
- Riparian corridor landscaping;
- Realignment of the Moore Gully and its tributary with all appropriate scour protections;
- Maintenance access paths; and
- Pedestrian access paths.
- Vegetation establishment for stormwater infrastructure and surrounds.

3 Works Involving Particular Risks

3.1 General

Work and work sequences have been identified during the design which involve particular risks and cannot be avoided and which will be a risk to health of construction workers and others. These are listed below.

The list does not address the common-place hazards or hazards where known solutions apply and which are associated with construction generally. These must be controlled by the application of normal good site management practices. It should be noted that standard known solutions are not free from risk and appropriate measures must be taken by the Contractor to minimise and/or control these risks.

It is to be noted that a more detailed means of accident prevention should be developed by the Constructor.

The information contained in this Safety in Design Report has been prepared prior to the commencement of the work on site. It does not take account of any matters or information which may come to light after that time.

3.2 Risks to Safety and Health of Persons at Work

The following is a non-exhaustive list of the particular risks to the safety and health of workers which have been identified during the design stage:

- Use of excavation equipment;
- Working alongside and within watercourses;
- Working alongside environments with stagnant water;
- Encounters with snakes;
- Working with heavy machinery adjacent to site;
- Slope instability – embankment failure;



- Unsafe construction; and
- Poor build quality.

3.3 Risks to Safety of the Public and Others

Designers risk assessment is presented below; however, it should be noted that the contractor should undertake their own Risk Assessment for work.

3.3.1 KEY FOR DESIGNER'S RISK ASSESSMENT

The risk analysis and evaluation techniques employed followed the 6x6 risk analysis matrix outlined in the Transport for NSW Risk Management Procedure – T MU MD 20002 ST (Version 2.0 dated 16 December 2020). The assessment was conducted utilising the following tables for qualitative measures of likelihood or frequency and qualitative measures of impact – consequence severity, provided in **Table 1** and **Table 2** respectively. The resulting risk levels are assessed using the 6x6 risk matrix provided in **Table 3** and the risk tolerance and responses in **Table 4**.



Table 1 Risk assessment – likelihood qualitative criteria

| LEVEL | MEASURE | CRITERIA TO BE USED TO ESTABLISH RATING |
|-------|----------------------|--|
| L1 | Almost Certain | <ul style="list-style-type: none"> Expected to occur frequently during time of activity or project Very strong chance of this risk occurring History shows that it is something that occurs frequently |
| L2 | Very Likely | <ul style="list-style-type: none"> Expected to occur occasionally during time of activity or project Good chance of this risk occurring History shows that the risk occurs unacceptably too often |
| L3 | Likely | <ul style="list-style-type: none"> More likely to occur than not occur during time of activity or project Chance of this risk occurring in the current period History shows that the risk has occurred on a number of occasions |
| L4 | Unlikely | <ul style="list-style-type: none"> More likely not to occur than occur during time of activity or project Chance of this risk occurring but not very often History shows that this risk does happen but not very frequently |
| L5 | Very Unlikely | <ul style="list-style-type: none"> Not expected to occur during the time of activity or project Only an unusual chance of this risk occurring History shows that this risk rarely happens, usually under unusual circumstances |
| L6 | Almost unprecedented | <ul style="list-style-type: none"> Not expected to ever occur during time of activity or project Very little or no real chance of this risk occurring History shows that this risk hardly ever happens, if at all |

Table 2 Risk assessment consequence criteria - safety

| LEVEL | IMPACT | EXAMPLE OF CONSEQUENCE |
|-------|---------------|--|
| C6 | Insignificant | <ul style="list-style-type: none"> Incident and/or injury/illness to staff/customer/community, not requiring first aid or medical treatment No lost time |
| C5 | Minor | <ul style="list-style-type: none"> Injury or illness to staff/customer/ community, requiring first aid or medical treatment (non-hospitalisation) No lost time post medical treatment Single event |
| C4 | Moderate | <ul style="list-style-type: none"> Minor injuries or illnesses to staff/customer/community, requiring professional medical treatment (that is, doctor, nurse, and paramedic) or hospitalisation resulting in lost time Injuries to customer/community requiring hospitalisation |
| C3 | Major | <ul style="list-style-type: none"> 1 to 10 serious injuries or illnesses to staff/customer/community, as defined under <i>section 36 of the Work Health and Safety Act 2011 (WHS Act)</i> resulting in hospitalisation, lost time and/or potential permanent impairment Multiple injuries to customer/community requiring hospitalisation Single event and/or multiple locations Coordinated emergency response required |
| C2 | Severe | <ul style="list-style-type: none"> Single fatality and/or 10 to 20 serious injuries or illnesses to staff/customer/ community, as defined under <i>section 36 of the WHS Act</i> (resulting in hospitalisation, lost time and/or potential permanent impairment) |



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| | | |
|----|--------------|---|
| | | <ul style="list-style-type: none"> ▪ Could impact safety across the network ▪ Coordinated emergency response required |
| C1 | Catastrophic | <ul style="list-style-type: none"> ▪ Multiple fatalities and/or more than 20 serious injuries or illnesses to staff/customer/community, as defined under <i>section 36 of the WHS Act</i> resulting in hospitalisation, lost time and/or potential permanent impairment. (permanent disabilities/chronic diseases) ▪ Transport unable to assure community and network safety ▪ Coordinated emergency response required |

Table 3 Risk Matrix for Determination of Risk Level (TfNSW, 2020)

| | | | Consequence | | | | | |
|------------|----------------------|----|---------------------|-------------|----------------|-------------|--------------|--------------------|
| | Description | | Insignificant C6 | Minor C5 | Moderate C4 | Major C3 | Severe C2 | Catastrophic C1 |
| Likelihood | Almost certain | L1 | D | C | B | A | A | A |
| | Very likely | L2 | D | C | B | B | A | A |
| | Likely | L3 | D | C | C | B | B | A |
| | Unlikely | L4 | D | D | C | C | B | B |
| | Very unlikely | L5 | D | D | D | C | C | B |
| | Almost unprecedented | L6 | D | D | D | D | C | C |

Table 4 Risk tolerance and responses table (TfNSW, 2020)

| Risk rating (current residual) | Response | Risk frequency |
|--------------------------------|--|---|
| Very High 'A' | 'Very High' risks are generally intolerable and should be avoided except in extraordinary circumstances. An alternative solution shall be found and all necessary steps shall be taken to reduce the risk below this level without delay. | Monthly update of risk register by the risk owner |
| High 'B' | 'High' risks are undesirable. They can only be tolerated if it is not reasonably practicable to reduce the risk further. High risks are considered to be on the verge of being unacceptable and shall be given immediate priority. | Monthly update of risk register by the risk owner |
| Medium 'C' | 'Medium' risks are generally tolerable if it is not reasonably practicable to reduce the risk further. Additional treatment measures should be sought if significant benefit can be demonstrated and/or an additional treatment measure available which is recognised as good practice in other like environments. | Two monthly update of risk register by the risk owner |
| Low 'D' | Low risks are considered to be broadly acceptable. If options for further risk reduction exist and costs are proportionate to the benefit, then implementation of such measure should be considered. | Quarterly update of risk register by the risk owner |

3.3.2 DESIGNERS RISK ASSESSMENT

The initial risk ratings and residual risk ratings after design action are utilised are provided in **Appendix A**.



4 Information Transfer

In accordance with the *Work Health and Safety Act 2011(NSW)*, the client must provide a copy of this Safety in Design Report to the Principal Contractor and ensure that the following actions are undertaken:

- > Onsite safety inductions, including hazards identified in this report, should be conducted for all staff;
- > Safety Management Plans should be prepared for the hazards identified in this report;
- > There should be no variation on design requirements without consultation with the original designers;
- > Onsite management of contractors to ensure that hazards that arise through starting/completion of jobs does not occur; and
- > This design may interface with other plans and account should be taken of any interface issues.



Appendix A Safety in Design Register



| Health and Safety in Design Risk Register [for Bradfield City Stormwater Trunk Infrastructure, Sediment Basins, Wetlands and Ponds Design] | | | | | | | | | | | | | | | | | | | | |
|---|-------------------------------------|---|---|--|---|--------------------------------------|-----------------------------|------------------|--|---|---|--|-----------------------------------|-----------------------------|------------------|---|---|--------------|---|---|
| Status: Issued As DRAFT - Risk Levels and actions to be validated by design package owners | | | | | | | | | | | | | | | | | | | | |
| 1 ID | WORK BREAKDOWN STRUCTURE | | RISK IDENTIFICATION | | | RISK ASSESSMENT PRIOR TO TREATMENT * | | | HAZARD ELIMINATION / RISK MINIMISATION | | | | RISK ASSESSMENT AFTER TREATMENT * | | | RESIDUAL RISK ALLOCATION * | 20 SFAIRP CONSIDERATIONS / JUSTIFICATION | 21 STATUS | 22 Comments (& ownership if transferred) | HSID Close Out & Confirmation of Risk/Hazard Transfer (initial / sign on pdf copy) |
| | 2 LIFE CYCLE STAGE | 3 WHERE & WHAT Location Site feature Interface Design element Drawing / reference | 5 HAZARD | 6 CAUSES | 7 CONSEQUENCES | 9 Risk consequences (1-6) | 10 Risk likelihood (1-6) | 11 Risk level | 12 Elimination possible? Y / N | 13 Justification if Elimination not possible | 14 Recommended Risk Minimisation: Safeguards / Action(s) / Controls State Hierarchy Of Control type for each control & list controls in HOC order (to be authorised) | 15 Responsibility | 16 Risk consequences (1-6) | 17 Risk likelihood (1-6) | 18 Risk level | 19 Responsible person / due date | | | | |
| 1 | Design | Inlet and Outlet | Scour and Erosion | Velocity of flow and site soil characteristics | Environmental damage, undermining basins / wetlands / ponds, transferring sediment to Thompsons Creek / Moore Gully. | C4 | L1 | High | Y | | Design scour protection at inlet and outlet where velocity warrants. Design erosion and sediment protection measures to reduce erosion potential. Gabion/Reno mattress are not to be used as they are often subject to vandalism and may cause injury when the steel wires become loose. Rip rap on geotxtiles are preferred. | Designer (Stantec) | C4 | L5 | Low | Stantec | | | | |
| 2 | Design | Site | Flooding | Rain event | Impact on maintenance access, nearby roads and buildings. | C4 | L2 | High | N | Natural Event | Design detention capacity to provide appropriate flow attenuation. Design maintenance access tracks to accommodate for appropriate design rainfall event. Add flood warning signages at key locations to advise the general public on the risk of flooding. | Designer (Stantec) | C4 | L5 | Low | Stantec | | | | |
| 3 | Design | Basin / wetland / pond infrastructure | 1. seepage of groundwater and other materials that maybe found in the soil. | High groundwater levels | Salinity of water in ponds and wetlands may be increased leading to poor wetland and water reuse outcomes. 2. High saline soil could impact on the growth of vegetations. | C4 | L2 | High | N | Groundwater levels may change | 1. Addition of organic matter, gypsum and lime to improve the soil condition. 2. Permeable liner to be laid in accordance with manufacturer's instructions. 3. Use salt tolerant and effective nutrient removal plants. 4. Wetland and pond invert level to be above groundwater table. | Geotechnical Engineers (others) | C4 | L5 | Low | Geotechnical Engineers (others) | | | | |
| 4 | Construction | Concrete items. | Salinity Condition on site | Moisture ingress into the steel | The saline condition could impact the durability of the concrete | C4 | L3 | Medium | N | Natural soil condition | 1. Durability of concrete and reinforcement steel should meet the recommendation provided in Salinity Investigation Report prepared by Douglas Partner (222630.00.R.004.Rev 0) | Contractor | C5 | L5 | Low | Contractor | | | | |
| 5 | Construction | Concrete items. | Lifting Heavy Elements | Culverts, pipes, headwalls are heavy elements requiring specialised equipment | Inadequate machinery for lift causes delay in construction, potential equipment failure, material damage and injury | C3 | L3 | High | N | Hazard will remain and cannot be eliminated | 1. Contractor to allow for appropriate haulage and lifting equipment and procedures. | Contractor | C3 | L6 | Low | Contractor | | | | |
| 6 | Construction | Site | Flooding | Rain event | Injury, material damage, construction delay | C4 | L3 | Medium | N | Natural Event | 1. Contractor to monitor weather forecast and schedule works appropriately. 2. Contractor to have incident management procedure for flooding. | Contractor | C5 | L4 | Low | Contractor | | | | |
| 7 | Construction | Site | Fire | Bushfire | Injury, restricted egress from site | C1 | L4 | High | N | Natural Event | Contractor to have incident management procedure for fire and have appropriate fire fighting equipment (for equipment fire). | Contractor | C3 | L4 | Medium | Contractor | | | | |
| 8 | Construction | Formation | Excavation Collapse | Incorrectly constructed batters | Injury, material/property damage, delay | C2 | L3 | High | Y | | 1. Contractor to construct in accordance with batter slope nominated on design documentation. 2. Monitor batter for signs of degradation and take steps to remediate. | Contractor | C2 | L6 | Medium | Contractor | | | | |
| 9 | Construction | Inlet and Outlet | Scour and Erosion | Rainfall event, disturbed surfaces, soil condition | Injury, material/environmental/property damage, delay | C6 | L2 | Low | N | Natural Event | 1. Apply ground cover over bare soil to minimise erosion. 2. Protect inlet and outlet from scour if rainfall event occurs during construction through diversion of flows, spreading of flows or temporary protection of surface. | Contractor | C6 | L5 | Low | Contractor | | | | |
| 10 | Construction | Site | Impact with vehicle | Public within site works extent. | Potential fatality | C2 | L3 | High | Y | | 1. Ensure access to construction site is appropriately restricted and construction activities are not accessible to the general public. Traffic management plans and exclusions zones are to be applied. | Contractor | C2 | L5 | Medium | Contractor | | | | |
| 11 | Construction | Existing Utilities | Asbestos exposure | Asbestos service pits/conduits found within the site. | Injury, construction delay | C3 | L5 | Medium | Y | | Refer to Site Audit Report and Site Audit Statement in Appendix B for Unexpected Finds Procedure. | Contractor / Contamination expert (others) | C4 | L6 | Low | Contractor / Contamination expert (others) | | | | |
| 12 | Construction | Existing Utilities | Unexpected finds | Limitations with ground penetrating radar surveys. | Construction delay | C6 | L3 | Low | Y | | Contractor to have a current unexpected finds policy. | Contractor | C6 | L4 | Low | Contractor | | | | |
| 13 | Construction | Site | Unstable ground conditions | Existing locations are noted to be boggy. | Injury, construction delay | C4 | L1 | High | Y | | 1. Wear appropriate PPE and ensure staff are aware of risks with poor ground conditions. 2. Contractor to follow SWMS with heavy vehicle movement strategy. | Contractor | C4 | L4 | Medium | Contractor | | | | |
| 14 | Construction | Site | Trench collapse / cave-in | Excavation greater than 1m. | Injury, construction delay | C3 | L2 | High | Y | | 1. Use protective measures while excavating. 2. Ensure workers are trained on safe excavation procedures and works are regularly inspected. | Contractor / Geotechnical team (by others) | C4 | L5 | Low | Contractor | | | | |
| 15 | Construction | Site | Snake bites | Snake habitats within the site. | Potential fatality | C2 | L3 | High | N | Snakes cannot be eliminated | 1. Provide workers training on snake awareness and first aid for snakebites. Ensure there are adequate first aid kits on site. 2. Clear snake-friendly habitat areas with extent of works. 3. Inspect site and report snake sightings. 4. Wear appropriate PPE. | Contractor | C4 | L4 | Medium | Contractor | | | | |
| 16 | Construction | Site | Mosquito bites | Potential for stagnant water to pond on site. | Injury | C5 | L5 | Low | N | Mosquitoes cannot be eliminated. | 1. Wear appropriate PPE and mosquito repellent. 2. Management of the wetlands to follow ecologist advice to promote good ecology. | Contractor | C4 | L6 | Low | Contractor | | | | |
| 17 | Operation | Site | Poor construction | Work not in accordance with design plans and Sydney Water specifications | Property damage, environmental damage | C3 | L4 | Medium | Y | | 1. Enganged competent contractor with SWMS to ensure safety and familiar with Sydney Water construction requirements. 2. Sydney Water to provide regular inspection during the construction. Contractor to follow Sydney Water's inspection and test plans including Hold Points and Inspections. | Contractor | C6 | L5 | Low | Contractor | | | | |
| 18 | Operation | Site | Drowning within stormwater device or infrastructure | Stormwater devices / infrastructure have inadequate public protection. | Potential fatality | C2 | L3 | High | Y | | 1. Planting exclusive vegetation to deter respassing or unwanted basin access. 2. Install signages to increase awareness of danger near the waterbodies. 3. All deep-water areas are to have a safety bench at 1 in 8 grade for at least 2.4m to assist in the ease of escape from the water body. | Landscape Architect | C4 | L5 | Low | Sydney Water | | | | |
| 19 | Maintenance | Access | 1. Poor conditions (i.e. ponding, potholes, obstructions) of access tracks 2. Inadequate safe access | Period of increased rainfall, extended periods between clearing/ maintenance | Property damage, injury | C6 | L3 | Low | Y | | 1. Maintain access corridor to prevent degradation. 2. Provide adequate access point to the basins. | Stantec/Sydney Water | C6 | L4 | Low | Sydney Water | | | | |
| 20 | Maintenance | Inspections | Slips/Trips/Falls | Steep/ unstable embankments | Potential fatality, injury | C2 | L3 | High | Y | | Wear appropriate PPE and ensure staff are aware of risks with embankments. | Sydney Water | C3 | L4 | Medium | Sydney Water | | | | |
| 21 | Maintenance | Inspections | Impact with vehicle | Poor coordination between access crews and limited area of maintenance paths | Potential fatality, injury | C2 | L3 | High | Y | | 1. Wear appropriate PPE to improve visibility of workers. 2. Establish clear communication protocols between vehicles and workers. 3. Avoid simultaneous works between vehicles and people. | Sydney Water | C2 | L5 | Medium | Sydney Water | | | | |
| 22 | Maintenance | Inspections | Falls, confined space in stormwater pit | Grate or cover not being placed properly Access stormwater pit without training or suitable equipments | Potential fatality, injury | C2 | L4 | High | Y | | 1. Step Irons to be installed in accordance to AS3500.3 and AS1657 2. Workers to be trained for confined space injury; 3. Grates/covers to be hinged or lockage to provide secure access 4. Wear appropriate PPE and ensure staff are aware of the risks before entering into the pits | Sydney Water | C4 | L5 | Low | Sydney Water | | | | |
| 23 | Construction/Maintenance/O peration | Site | Physical contact with existings utilities | Excavating within an area without knowledge of the location of existing utilities | Potential fatality, injury, damage to assets | C2 | L2 | Very High. | Y | | 1. DBYD data to be obtained and reviewed before construction 2. If there is a known utility, contractor to take extra care when excavating, opting for manual hand digging when approaching close to the asset. | Contractor | C4 | L1 | High | Contractor | | | | |
| 24 | Construction/Maintenance/O peration | Site | Bird strike | Birds colliding with planes | Potential fatality, injury to birds | C3 | L2 | High | N | Cannot control birds, however mitigation strategy to be advised | 1. Basins are likely to be outside of the exclusion zone. Bird mitigation strategy and guidelines to be developed and advise on mitigation measures to be implemented. 2. Bird monitoring and adaptive management plan to be developed to advise when further mitigation measures are required to reduce risk of bird strike. | Sydney Water | C3 | L5 | Medium | Sydney Water | | | | |
| 25 | Maintenance | Wetland and Ponds | Damage to the impermeable liners | 1. Rapid change in water level may effect the pressure on the base material of the wetland and pond, which impact on the stability of the liner 2. Excavation to remove sediments at the bottom of the basin. | Damage to the impermeable liner | C4 | L4 | Medium | N | Regular maintenance is required to maintain storage in the sediment ponds | 1. For trunk drainage channels that are predicted to have a high litter load install suitable Gross Pollutant Traps at the upstream of the basins to reduce the frequency of the basin maintenance. 2. When carrying out sediment removal works ensure the machine operators are suitably skilled and experienced and are informed of the required depths to excavate before works occur to ensure the impermeable liner is not compromised. 3. Inspect the liner at the end of sediment removal works, and if damaged repair the liner in accordance with the manufacturer's instructions. | Sydney Water | C5 | L5 | Low | Sydney Water | | | | |

| Health and Safety in Design Risk Register [for Bradfield City Stormwater Trunk Infrastructure, Sediment Basins, Wetlands and Ponds Design] Status: Issued As DRAFT - Risk Levels and actions to be validated by design package owners | | | | | | | | | | | | | | | | | | | | |
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| 26 | Construction | Site | Adjacent construction works | 1. Bulk earthwork, road construction of Bradfield City will be occurring at the same time | Potential fatality, injury | C2 | L3 | High | N | Staging of works | 1. Safety induction to be carried out before start of work 2. Contractor to follow SWMS. 3. Wear appropriate PPE. 4. Ensure set up of traffic control plan to avoid collision of vehicles. | Contractor | C4 | L4 | Medium | Contractor | | | | |

Appendix B Site Audit Report and Site Audit Statement

