



Controlled Water Overflow Management Strategy

Project: Sydney Metro City & Southwest – TSE Works

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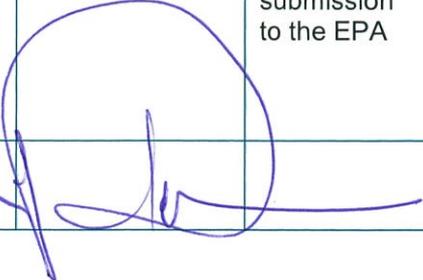
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1.0 Overview

1.1 Purpose

The purpose of this strategy is to describe how John Holland CPB Ghella (JHCPBG) will manage surface water which, during rainfall events, will occur within the TBM dives, station box excavations and shafts during the construction of the Sydney Metro City & Southwest Tunnel and Stations Excavation Works Project (TSE Works).

Sediment basins are established for surface sites, sized adequately to accommodate the 5-day, 85th percentile rainfall depth, with overflows expected once this event is exceeded. This principle will apply to TSE excavations to permit adequate drainage from the worksite.

Furthermore, during construction, the tunnel and the excavations used to access and support tunnelling are at risk of flooding due to intensive rainfall. JHCPBG will manage excavations and discharge of excavations as surface sites and undertake dewatering of the excavations.

1.2 Scope

This strategy applies to the following scope of works:

- During civil excavation of the TBM dives, station boxes or shafts along the TSE alignment until an enclosure over the excavation is constructed for:
 - Chatswood TBM dive site
 - Artarmon shaft site
 - Crows Nest station box site
 - Victoria Cross station box site
 - Blues point shaft
 - Barangaroo TBM dive site
 - Martin Place station box and access shaft sites
 - Pitt Street station box and access shaft sites
 - Waterloo station box site
 - Marrickville TBM dive site
- • Once the excavation (dive, station box or shaft) is established and tunnelling has commenced for:
 - Chatswood TBM dive site
 - Barangaroo TBM and Roadheader site
 - Martin Place South Roadheader site
 - Pitt Street South Roadheader site
 - Marrickville TBM dive site

These sites include acoustic barriers and enclosures where required, however there are large areas which will capture stormwater (See Appendix A for site layouts of these sites).

The existing soil and hydrogeological environment is detailed in Section 4.0 of the CSWGMP.

1.3 Objectives and targets

The objectives for this strategy are to:

- Minimise the impacts of the TSE Works on surrounding surface watercourses
- Minimise the potential for flooding of excavations and tunnels on the TSE worksites
- Apply management principles from Managing Urban Stormwater: Soils and Construction (Volume 1 of the Blue Book) (Landcom, 2004)

1.4 Interactions with other management plans and guidelines

This strategy is an adjunct to the Construction Soil, Water and Groundwater Management Plan (SMCSWTSE-JCG-TPW-EM-PLN-002014) (CSWGMP) and relates to the:

- Stormwater and Flooding Management Plan (SMCSWTSE-JCG-TPW-DN-PLN-0020032)
- Site-specific Erosion and Sedimentation Control Plans will be progressively prepared for TSE Worksites, as per the Construction Soil and Water Management Plan (SMCWSTSE-JCG-TPW-EN-PLN-002014).

This strategy applies principles from:

- Managing Urban Stormwater: Soils and Construction (Volume 1 of the Blue Book) (Landcom, 2004)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the ANZECC Guidelines) (ANZECC, 2000)

1.5 Structure of this Strategy

The structure of this Strategy is as follows:

- Section 1.0 – Background and purpose of the Strategy
- Section 2.0 – Detail of the methodology for the overflow process
- Section 3.0 – A Risk Assessment of the overflow process and controls to be implemented

2.0 Strategy

2.1 Methodology

Rainwater will be captured within the excavation/dive/station box/shaft in a formalised, designed sump. A pump will be installed in the sump and will be isolated until such time that a Dewatering Permit (Water Reuse and Discharge Management Procedure (SMCSTSE-JCG-TPW-EM-MPR-003002)) is issued by the JHCPBG Environment Manager and the relevant Construction Manager.

The pump will be appropriately sized and will move captured water from the excavation/dive/station box/shaft into an intercept point (typically a water tank). The intercept point will be designed to be appropriately sized to capture the total volume of the 5 day, 85th percentile rainfall depth for the relevant catchment per location. The intercept point will act as a first flush system to retain potential sediment.

The overflow mechanism from the intercept point will be designed to moderate the rate of overflow to mimic a sediment basin.

Once a rainfall event ceases and the sump capacity is restored, pumping from the sump in the excavation/dive/station box/shaft will stop. The overflow of the intercept point will continue until the water level reaches equilibrium with the overflow mechanism. The remnant water will be diverted into the water treatment plant (WTP) and treated within the permitted 5 days. Figure 1 illustrates the above process.

2.2 Monitoring

Visual inspections will be undertaken pre, post and during rainfall events to monitor the overflow.

2.3 Training

Training in the form of on-site inductions and toolboxes will be used to educate the construction teams on the controls outlined in Section 3.0 of this strategy. This strategy will be included in Work Packs which relate to bulk excavation and surface support tunnelling.

Water Management Overview

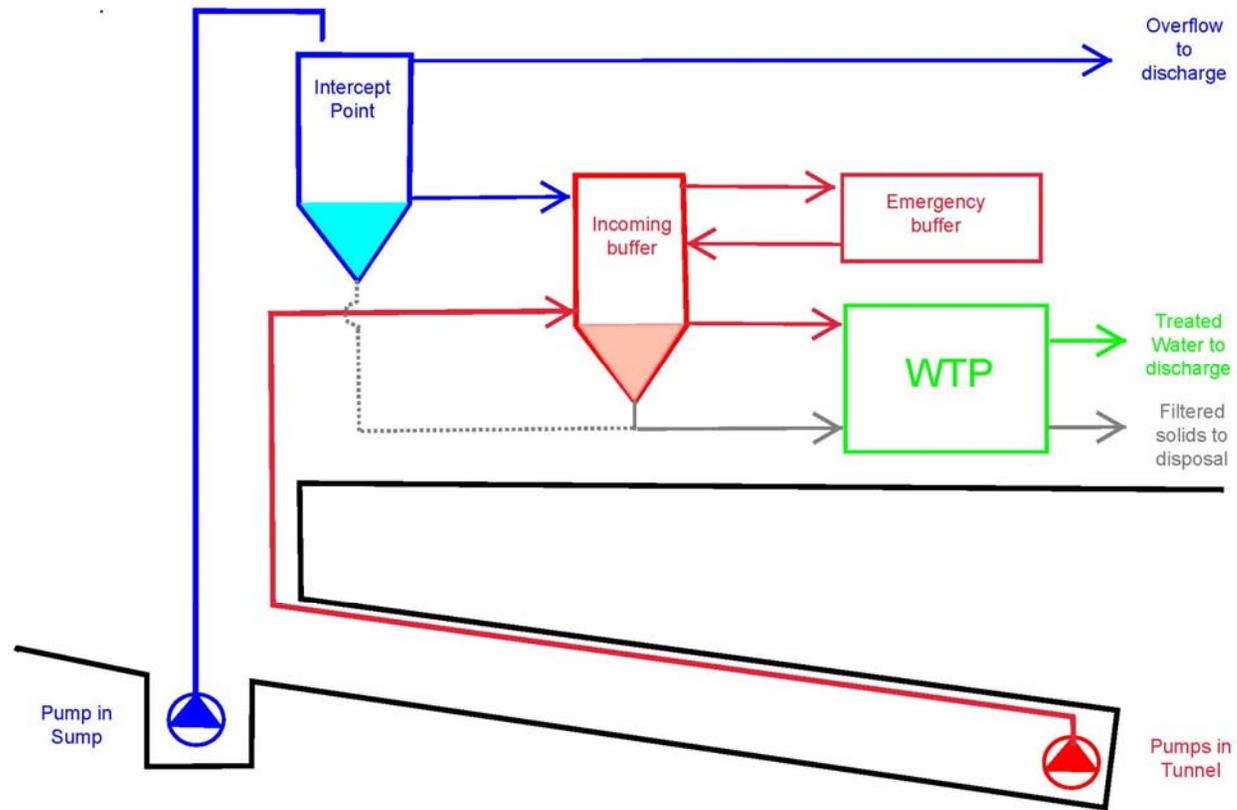


Figure 1: Controlled Water Overflow Process Schematic

3.0 Risk assessment and mitigation measures

Table 1 details the proposed risks, provides a description of the proposed works, justification, timing, uncontrolled risk rating, key environmental controls and residual risk rating. Refer to the CSGWMP (SMCSWTSE-JCG-TPW-EM-PLN-002014) for full detail on controls in addition to the controls detailed in the risk assessment below.

Table 1: Controlled Water Overflow Risk Assessment

| Scope of Activity | Location | Justification | Potential Environmental Risks | Uncontrolled Risk Rating | Key Environmental Controls | Residual Risk Rating |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| Civil excavation of the TBM dives, station boxes or shafts | | | | | | |
| Dewatering of the excavation to stormwater during a rainfall event if the rainfall exceeds the 5-day, 85 th percentile of the average rainfall depth for the catchment (Landcom, 2004) (38.8mm for TSE) | <ul style="list-style-type: none"> Chatswood TBM dive site Artarmon shaft site Crows Nest station box site Victoria Cross station box site Blues point shaft Barangaroo TBM dive site Martin Place station box and access shaft sites Pitt Street station box and access shaft sites Waterloo station box site Marrickville TBM dive site | Sediment basins are established for surface sites, sized adequately to accommodate the 5-day, 85 th percentile rainfall depth and to overflow once that event is exceeded. This principle should apply to TSE excavations to permit adequate drainage from the worksite. | <p>Impact on water quality of waterways as a result of:</p> <ul style="list-style-type: none"> Increased sediment load and/or oil and grease discharge compared to basin overflow sediment/ oil and grease loads | L2C3 – B Major | <ul style="list-style-type: none"> Minimisation of surface flows into the excavations including diversions using capping beams and enclosure of the excavations (refer to CSGWMP SMCSWTSE-JCG-TPW-EM-PLN-002014) Certification of the overflow system by the Project's Soil Conservationist and relevant JHCPBG personnel including: <ul style="list-style-type: none"> Formalised sumps to be designed, constructed and maintained Formalised intercept point to be designed, | L4C5 – D Minor |

Controlled Water Overflow Management Strategy

| Scope of Activity | Location | Justification | Potential Environmental Risks | Uncontrolled Risk Rating | Key Environmental Controls | Residual Risk Rating |
|-------------------|----------|---------------|-------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| | | | | | <p>constructed and maintained</p> <ul style="list-style-type: none"> • Capture of the first flush within the intercept point to reduce the sediment load. • Visual inspections will be undertaken pre, post and during rainfall events to monitor the overflow. • Inspections to be undertaken by the Project's Soil Conservationist to ensure controls are adequate against the 'Blue Book'. • Maintenance of the excavation to minimise the potential for foreign materials • Post rainfall water contained in the intercept point will be reused onsite or treated and discharged within 5 days • Overflow pump to be isolated and locked-out until a dewatering permit | |

Controlled Water Overflow Management Strategy

| Scope of Activity | Location | Justification | Potential Environmental Risks | Uncontrolled Risk Rating | Key Environmental Controls | Residual Risk Rating |
|-------------------|----------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| | | | <ul style="list-style-type: none"> Discharging of 'overflow' waters less than the 5 day, 85th percentile rainfall depth Increased 'overflow' flow rates in comparison to a sediment basin. Discharge of groundwater | | <p>is approved by the environment manager and construction manager.</p> <ul style="list-style-type: none"> Float switches installed to automatically cease overflow pumping. Sumps and intercept points to be designed for capacity to maintain the 5 day, 85th percentile rainfall depth Procurement of pumps which adhere to a designed flow-rate applicable to basin overflow rates. Groundwater ingress monitoring and testing to confirm quantity and concentration of groundwater. Dilution analysis undertaken prior to first overflow discharge to confirm dilution concentrations. Pit protection (e.g. drain wardens) on existing stormwater pits. | |

Controlled Water Overflow Management Strategy

| Scope of Activity | Location | Justification | Potential Environmental Risks | Uncontrolled Risk Rating | Key Environmental Controls | Residual Risk Rating |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Established excavation of the TBM dives, station boxes or shafts and commencement of tunnelling | | | | | | |
| <p>Dewatering of the excavation to stormwater during a rainfall event if the rainfall exceeds the 5-day, 85th percentile of the average rainfall depth for the catchment (Landcom, 2004) (38.8mm for TSE)</p> | <ul style="list-style-type: none"> Chatswood TBM dive site Barangaroo TBM dive site Martin Place South Roadheader site Pitt Street South Roadheader site Marrickville TBM dive site | <p>Sediment basins are established for surface sites, sized adequately to accommodate overflow once the 5-day, 85th percentile rainfall depth and to overflow once that event has been exceeded. This principle should apply to TSE excavations to permit adequate drainage from the worksite.</p> <p>Flooding of the tunnel is not permissible as it has the potential to unreasonably compromise the safety of personnel</p> | <p>Impact on water quality of waterways as a result of:</p> <ul style="list-style-type: none"> Increased sediment load and/or oil and grease discharge compared to basin overflow sediment/ oil and grease loads | <p>L2C4 – B Moderate</p> | <ul style="list-style-type: none"> Minimisation of surface flows into the excavations including diversions using capping beams and enclosure of the excavations (refer to CSGWMP SMCSWTSE-JCG-TPW-EM-PLN-002014) Certification of the overflow system by the Project's Soil Conservationist and relevant JHCPBG personnel <ul style="list-style-type: none"> Formalised sumps to be designed, constructed and maintained Formalised intercept point to be designed, constructed and maintained Capture of the first flush within the intercept point to reduce the sediment load. | <p>L4C5 – D Minor</p> |

Controlled Water Overflow Management Strategy

| Scope of Activity | Location | Justification | Potential Environmental Risks | Uncontrolled Risk Rating | Key Environmental Controls | Residual Risk Rating |
|-------------------|----------|---------------|-------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| | | | | | <ul style="list-style-type: none"> • Visual inspections will be undertaken pre, post and during rainfall events to monitor the overflow. • Inspections to be undertaken by the Project's Soil Conservationist to ensure controls are adequate against the 'Blue Book'. • Sealing and regular cleaning of the dive/station box/shaft when rain is imminent to keep runoff as much as possible • Maintenance of the dive/station box/shaft to minimise the potential for foreign materials • Overflow pump to be isolated and locked-out until a dewatering permit is approved by the environment manager and construction manager. | |

Controlled Water Overflow Management Strategy

| Scope of Activity | Location | Justification | Potential Environmental Risks | Uncontrolled Risk Rating | Key Environmental Controls | Residual Risk Rating |
|-------------------|----------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| | | | <ul style="list-style-type: none"> Discharging of 'overflow' waters less than the 5 day, 85th percentile rainfall depth Increased 'overflow' flow rates in comparison to a sediment basin. Discharge of groundwater | | <ul style="list-style-type: none"> Float switches installed to automatically cease overflow pumping. Sumps and intercept points to be designed for capacity to maintain the 5 day, 85th percentile rainfall depth Procurement of pumps which adhere to a designed flow-rate applicable to basin overflow rates. Groundwater ingress monitoring and testing to confirm quantity and concentration of groundwater. Dilution analysis undertaken prior to first overflow discharge to confirm dilution concentrations. Pit protection (e.g. drain wardens) will be installed in any operational stormwater pits. | |

Risk Matrix

| Risk Rating A – Very High B – High C – Medium D - Low | | | Consequence | | | | | |
|--------------------------------------------------------------------------|----------------------|----|---------------|-------|----------|-------|--------|--------------|
| | | | Insignificant | Minor | Moderate | Major | Severe | Catastrophic |
| | | | C6 | C5 | C4 | C3 | C2 | C1 |
| Likelihood | Almost certain | L1 | C | B | B | A | A | A |
| | Likely | L2 | C | C | B | B | A | A |
| | Possible | L3 | D | C | C | B | B | A |
| | Unlikely | L4 | D | D | C | C | B | B |
| | Rare | L5 | D | D | D | C | C | B |
| | Almost unprecedented | L6 | D | D | D | D | C | C |

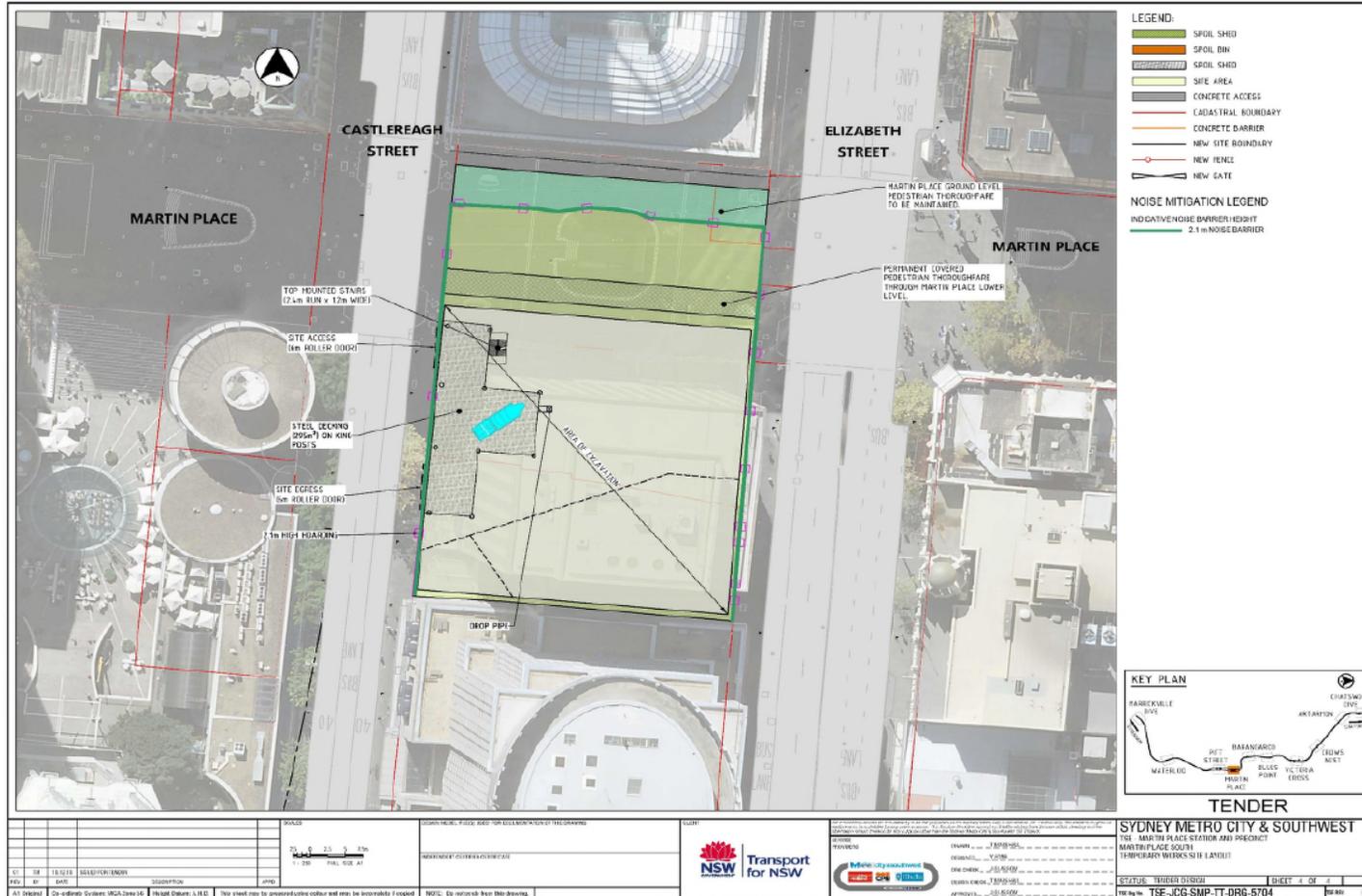
Appendix A – Indicative Site Layouts including excavation enclosures for established TSE worksites

Chatswood Worksite

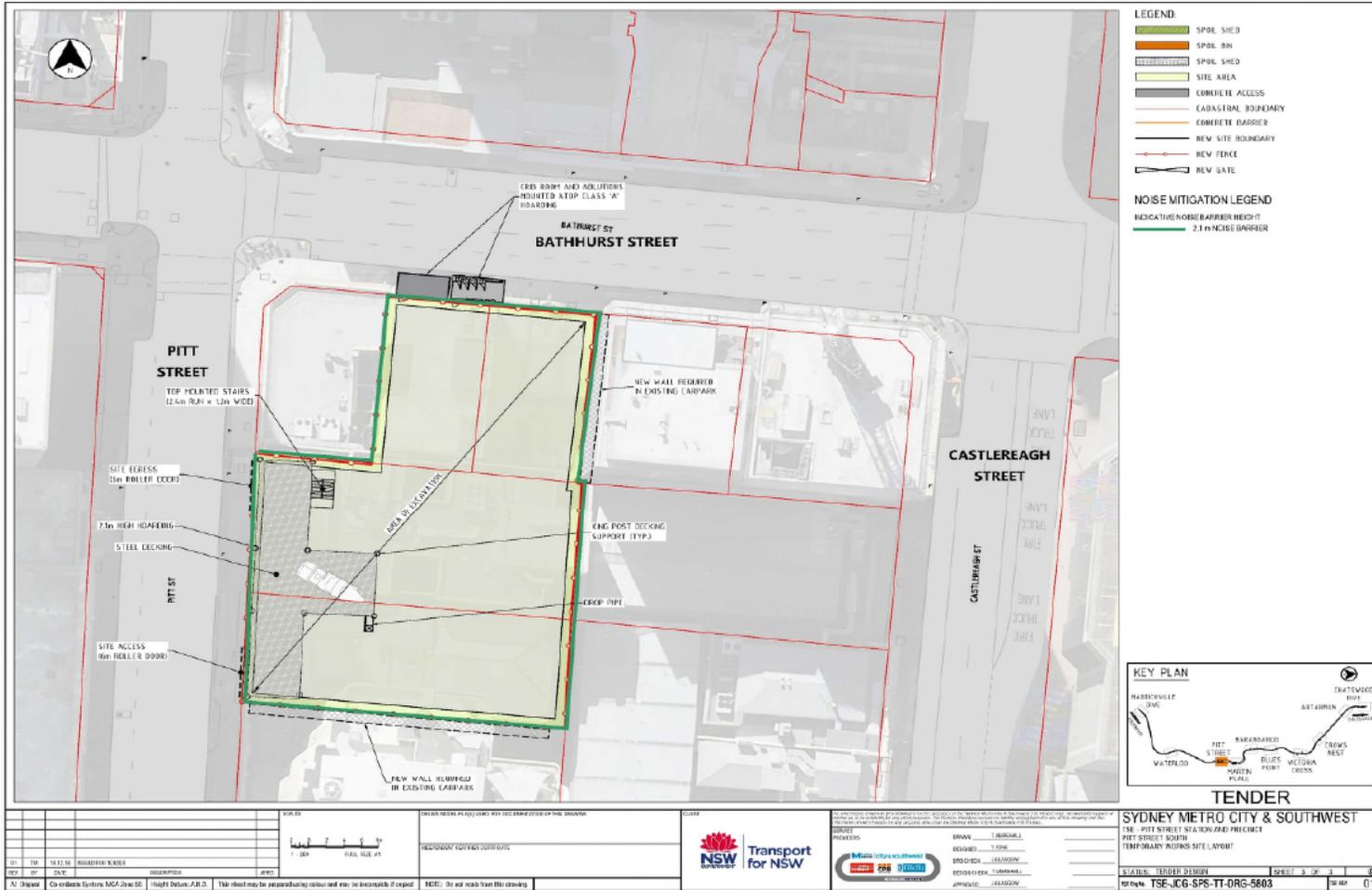


Controlled Water Overflow Management Strategy

Martin Place South Worksite



Pitt Street South Worksite



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Waterloo Worksite



Controlled Water Overflow Management Strategy

Marrickville Worksite

