Appendix F: Staging, Demolition and Construction Management Plan

METRONET Byford Rail Extension
Construction Management Plan - Armadale Viaduct

Construction Management Plan

Document details	
Title	Construction Management Plan - Armadale Viaduct
Project	Byford Rail Extension (BRE) Design and Construction Project
Laing O'Rourke Project No.	R30
Client	Public Transport Authority of Western Australia
Client contract No.	PTA200142
MetCONNX Document No.	R30-MET-PLN-CM-000-00003

Document revision history and sign-off

Rev	Date	Revision Description	Prepared by	Reviewed by	Approved by
A	13/03/23	Issued for review	Aston Williams	Sean Doherty	Sean Doherty
B	04/04/23	Updated with OMTID Comments	Aston Williams	Sean Doherty	Sean Doherty

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Figures

Acknowledgment of Country

MetCONNX acknowledges the Whadjuk People and the Gnala Karla Booja People as the Traditional Custodians of the land and waters on which Byford Rail Extension Project is located.
We pay our respects to Elders, past, present and emerging, and thank them for their continuing connection to country, culture and community.

1. Project overview

1.1 METRONET Vision and Objectives

As one of the largest single investments in Perth's public transport, METRONET will transform the way the people of Perth commute and connect. It will create jobs and business opportunities and stimulate local communities and economic development to assist communities to thrive. The METRONET vision is for a well-connected Perth with more transport, housing and employment choices. In delivering METRONET, the WA Government has considered peoples' requirements for work, living and recreation within future urban centres with a train station at the heart.

The objectives are to:

- Support economic growth with better-connected businesses and greater access to jobs
- Deliver infrastructure that promotes easy and accessible travel and lifestyle options
- Create communities that have a sense of belonging and support Perth's growth and prosperity
- Plan for Perth's future growth by making the best use of our resources and funding
- Lead a cultural shift in the way government, private sector and industry work together to achieve integrated land use and transport solutions for the future of Perth.

1.2 Byford Rail Extension overview

The Byford Rail Extension (BRE) Project has been identified as an essential component of the METRONET program. The Project will extend the electrified passenger rail service from Armadale to Byford, providing a strong transport connection between these two centres, supporting economic growth and providing greater access to jobs. The Project has been developed in line with policy objectives for highly integrated transport and land use planning.

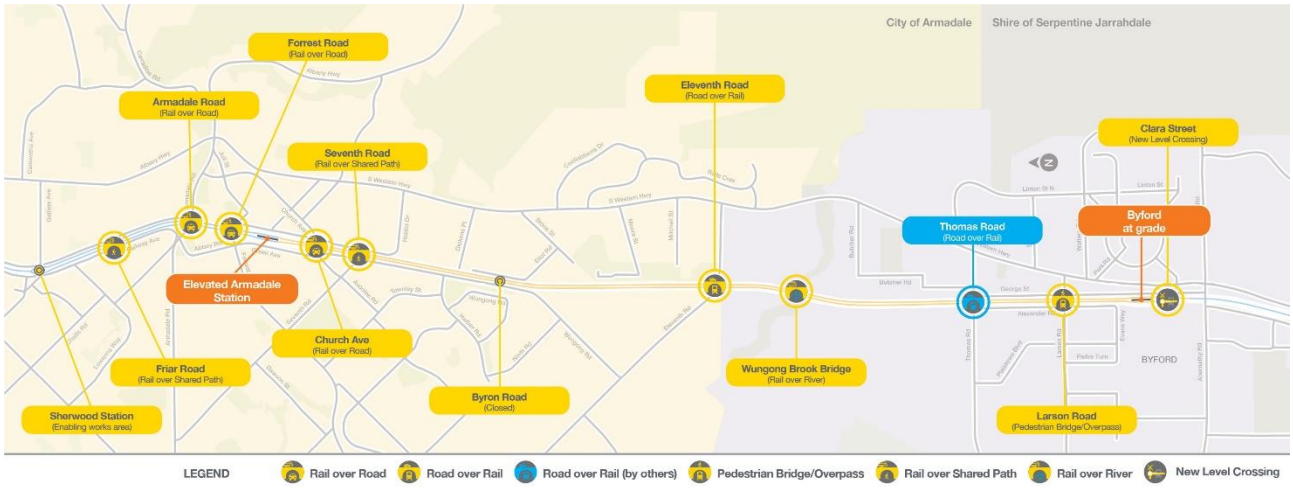


Figure 1: METRONET Byford Rail Extension Project

1.2.1 Project features

Transport infrastructure works for the BRE Project include:

Demolition of existing station at Armadale and construction of a new elevated station

Construction of a new Byford station at grade

Construction of approximately 8km of dual track narrow gauge electrified passenger railway line extending from Armadale station to the newly created Byford station, with a dedicated platform for the Australind line

Removal of level crossings between the Byford and Armadale stations

Construction of PSPs and associated infrastructure (including 'rail over road' and 'road over rail' bridges and roads)

Parking areas at Armadale and Byford stations

Bus interchange at Armadale and Byford stations

Upgrade of local roads surrounding both Armadale and Byford stations.

1.2.2 General scope of works

The Project's general scope of works includes designing, procuring, manufacturing, constructing, installing and commissioning all rail infrastructure and ancillary works to support an electrified operational passenger rail between Armadale and Byford Stations. Also, in the case of the Australind train service, tying into the non-electrified rail network south of Byford Station.

The Project activities include all site investigation, design, planning, scheduling, procurement, cost control, approvals, construction, OH&S management, environmental management, quality management, testing and commissioning, Entry into Service (EIS), training and operational readiness required to tie the rail extension to Byford into the existing rail network including the associated road, utilities and other required works to interface with adjacent works and contracts. This will include bulk earthworks and retaining structures, grade separations, roads, and drainage, the demolition and removal and treatment of waste material and contaminated material resulting from construction of the Works, and temporary works constructed for the purpose of facilitating the Works.

The project scope also includes any new road works, modifications to existing roads and signalised intersections, utilities (diversion, protection, and new installation) and any other ancillary works to enable the BRE Project.

2. Purpose of this plan

2.1 Expectation and objectives of the Construction Management Plan - Armadale Viaduct

The purpose of the Construction Management Plan - Armadale Viaduct is to describe the construction methodology to be adopted by MetCONNX to facilitate the safe and effective delivery of works for the Armadale Viaduct.

2.2 Terms and definitions

The terms, abbreviations and acronyms used in this management plan are as defined in Appendix A.

3. Scope of this plan

The Construction Management Plan will:

- Clearly describe the scope of works to be undertaken on the Armadale Viaduct structure and approach ramps including quantities and types of activities, work areas and stages
- Include as attachments construction related sub-plans (i.e., Construction Staging drawings & Site Management Plan).
- Detail how MetCONNX will manage interactions with surrounding key stakeholders and construct the viaduct structure with the least impact to surrounding stakeholders as possible.
- Determine effective construction staging that will ensure current rail operations and the associated transport facilities' operational requirements are maintained, and impact to these is minimised during construction
- Describe procedures for the management of subcontractors and their plans and work method statements
- Describe the processes to ensure the compatibility of any necessary temporary works with each other and with the Works
- Describe procedures to demobilise activities and the Works, including demobilisation of personnel, plant and equipment and closeout of stakeholder communications
- Address the management of interfaces with all authorities and other contractors including:
    - Communication channels, processes for ensuring efficient information flow, communication protocols and meeting schedules
    - Sequencing and timing of activities with the interfaces, including special programs
    - Programming of works to be conducted during track possessions
    - Roles and responsibilities of personnel and organisations for key aspects of the interface
    - Technical and program requirements
    - Work implications and applicable construction methodologies
    - Review of processes and timetables

4. Construction planning and program

4.1 Staging

The entire planning, programming and staging philosophy for the BRE Project is based on the key objectives to deliver the Project safely and on time while minimising impacts on the environment, community and existing rail operators. The methodology and program have been developed to:

- Safely deliver the desired outcomes
- Effectively address the multiple Project interface requirements
- Minimise exposure to the risks of site contamination and working in a live rail environment
- Manage progress to stay on schedule.

The Civil Works Construction Manager will control detailed staging diagrams for key elements of the Project. The detailed staging diagrams will be reviewed in conjunction with the Construction Management Plan. Detailed staging plans along with relevant controls & considerations can be found in appendix D of this document.

4.2 Methodology

4.2.1 General approach

All work will be undertaken in accordance with the MetCONNX Safety Management System and project safety management plans. Each construction work area will have a detailed assessment undertaken that considers site-specific requirements for safety, worksite protection including demarcation and signage, particular site risks, community impacts, environmental impacts, local traffic management, live rail interfaces, other contractor interfaces and dependencies, and allocation of overall site responsibilities. Work activities will be undertaken following a risk assessment and described in the SWMSs. These risk assessments will mitigate all known risks relative to the site and work activity and will be included in the work packs.

All construction work will first be digitally engineered and managed via the work packs which contain all input information such as drawings, permits, ITPs, program, safety requirements, risks, and engineering studies. This allows management and control of lots and maintains overall quality assurance. No construction work will start without a work pack. The main construction areas of work are:

- Utilities & relocations
- Civil works
- Structures

5. Temporary works

All temporary works will follow the MetCONNX Temporary Works Procedure to ensure they are safely identified, designed, erected, inspected, maintained and dismantled. The Temporary Works Coordinators and Project Technical Lead will review the full scope of works to identify the temporary works required to deliver the permanent works.

MetCONNX has developed a very thorough Temporary Works Control register (TWCR) and this can be seen in Appendix C: Temporary Works Control Register.

Temporary works with the potential to impact PTA operations or adversely impact public safety will follow the same design and verification process as the final works to ensure the arrangements are adequate and fit for their intended purpose. Construction of temporary works will also follow the same engineering pack process as the final works.

All temporary works will be recorded on the TWCR, the risks assessed, and the temporary works classified. This will ensure appropriate controls are in place and the works are inspected and maintained in line with the design. The appointed Temporary Works Coordinators will be involved in the classification of the temporary works. If there is any doubt about the classification, the temporary works will be assessed as being at the next higher classification. Classification examples are included in the Temporary Works Classification and Control Measures Guidelines.

A Temporary Works Coordinator, and alternative, will be nominated to oversee temporary works activities across the Project. They will be suitably qualified with the relevant competencies.

MetCONNX will remove all temporary works items either at completion of the temporary works or Project completion.

5.1 Lifting activities for temporary works

All lifting activities will be undertaken in accordance with MetCONNX partner Laing O'Rourke's Fatal and Severe Risk (FSR) Safety Management System, which is aligned with AS 4991 Lifting Devices, AS 3775 Chain Slings for Lifting Purposes, and AS 2549 Cranes. Refer also to the Project Safety Management Plan (R30-MET-PLN-SA-000-00001).

For all lifting activities, the following FSR assessments will be undertaken to ensure the lift is undertaken safely and in accordance with the Laing O'Rourke Safety Management System:

- FSR 01 – Excavations, Underground and Overhead Services
- FSR 02 – Plant and Equipment
- FSR 03 – Cranes and Lifting
- FSR 04 – Working at Heights.

Laing O'Rourke have a training program called 'Appointed Person' which provides the person with the correct Industry qualifications to plan and supervise the crane lift and associated rigging requirements. The site Appointed Persons will be responsible for the planning and supervision of all lifts on-site. In addition to this, the Temporary Works Coordinator (TWC) will be responsible for all temporary works associated with the lift. These include the following:

- Crane working platform
- Special lifting beams/frames
- Modules and lifting lugs, designed and fabricated for lifting (DfMA)
- Lifting inserts for precast.

Once the Plan has been approved by the Appointed Person and TWC, a qualified rigger/dogman will be the only person allowed to connect the crane to the load and the Appointed Person and/or the Lift Supervisor will be on-site to supervise the lift.

6. Plant, equipment and materials

Safety, quality and minimising the environmental impact will all be considered when procuring, evaluating and accepting plant, equipment and material.

Earthworks and road works at times will require interaction with road traffic and construction of the new Works. Where vehicles are required to work on existing roads, they will comply with Part 3 of the Road Traffic Regulations 2002 (WA). This also includes the delivery of fill material to the Project work front. All works will be undertaken within the approved Traffic Management Plan (developed after award) where construction plant is fully separated from the public.

Heavy plant within the construction site will be transported to or from site where the loading/offloading activities are managed by separating people from the activity, controlling the risk of falls from heights from the rear of trucks and ensuring chain of responsibility obligations are met. This includes ensuring that the traffic management plans include vehicle movement to ensure exclusion zones are applied behind safety barriers to protect workers from entering the deflection zones of the barriers and traffic controls, and signage and devices are in place to effectively warn, inform and guide road users through the work area. This also includes ensuring pedestrian movement is covered and they are separated from plant and the construction site.

Traffic Management is covered in Section 9.1.3 with Traffic Management Staging Plans in Appendix E: Traffic Management Plan.

Where works are away from the public, heavy vehicles (earthwork crews) will be separated from other work groups via designated work areas or exclusion zones under their own traffic management plan specific to the construction site. Heavy vehicles and light vehicles are segregated wherever possible with heavy plant loaded from stockpiles within the construction site where materials have been brought in by road trucks. The construction sequencing and planning of the Works has been undertaken to ensure all services have been relocated or protected prior to works commencing, including protection for heavy vehicles, and works are sequenced in a way that ensures the plant does not operate on final products.

Access roads, piling and crane pads have been allowed to ensure suitable platforms are in place for these Works.

6.1 Other plant requirements

All plant and equipment will be regularly serviced, repaired and maintained in accordance with the O&M manual. Records for the past three months of servicing, repair and maintenance will be kept with the relevant item of plant or equipment and available for inspection while on-site. When an item of plant arrives on-site, it will be inspected prior to use.

Critical plant used on the Project will be fitted with the Toolbox Spotter. The Toolbox Spotter is a visual safety system which provides more visual awareness to a plant operator. The system involves placing a camera to the blind spot of a piece of plant. When the camera picks up that a person or hazard is in the area, the operator will be alerted, allowing them to assess the situation before continuing. The Toolbox Spotter will only be relied on where it is impractical to use a spotter (i.e., in tight areas where it would be difficult to safely manage people and plant separation).

Figure 2: Toolbox spotter working example

Before use each day, all plant operators are responsible for undertaking a pre-start inspection. Records of inspections must be kept in logbooks and copies submitted weekly. Where any fault that affects the operational safety of the plant is identified, the operator must isolate the plant, and place an OUT OF SERVICE tag on the plant until the fault is fixed. This requirement applies to all plant including hired and subcontractor-owned plant.

Plant owners and operators must ensure that all scheduled maintenance and servicing, as well as fault repairs, is carried out as required, and records submitted to the respective Project Discipline Manager.

All earthmoving machinery must be fitted with ROPS (Roll Over Protection System) and FOPS (Falling Object Protection System) compliant to AS 2294, and as required by WA OHS Regulation. ROPSs that have been designed and tested in accordance with AS 2294 will have a permanent label attached in a prominent position where it can be easily read and where damage by weather or abrasion is minimised. Where an item of plant is not prescribed to be fitted with ROPS or FOPS, the risk assessment must determine the need for protective structures, according to the way the plant is to be operated.

Plant will be fitted with reversing cameras where required in the SWMS unless full visibility is available from the operator's cabin and where risk assessment identifies direct visibility as a higher level of control (e.g., forklift). All plant on-site will be registered on a plant register.

Before any electrical equipment or tools are used on-site, they must be inspected, tested and tagged by a suitably qualified person. The electrical tool register must be forwarded to site prior to induction and start of works on-site. Electrical tools and equipment must be regularly checked for damage or wear, inspected, and re-tagged on a supplier's recommendation basis with the register updated accordingly.

6.2 Craneage and general lifting requirements

For any works requiring lifting operations and craneage, MetCONNX will follow Laing O'Rourke's Safety Management System and produce lift studies and plans with an Appointed Person in charge of each lift. Refer to Table 1 below and the Safety Management Plan (R30-MET-PLN-SA-000-00001) for further details.

Table 1: Cranes and lifting operations expectation

	Reference documents	How will we meet the expectation? (Minimum requirements)	Responsible person	Deliverables
Expectations to manage and crane lifting operations	• PS – Cranes and Lifting • FSR 03 Cranes and Lifting • Lifting Operations • PS – Plant and Equipment	Ensure that crane risks have been captured in Project Risk Assessment.	Civil Works Construction Manager/HSE Manager	During risk workshop monthly reviews
		Develop a lifting operations plan and will appoint people with appropriate training and competency to supervise lifting operations. This includes verification of rigging arrangements where required. The Appointed Person will be on-site before and during all lifting operations and will undertake random checks of rigging gear and lifting set up.	Crane Appointed Person Crane Supervisor Crane Operator	Appointed Persons and Permit Controller Register
Expectations to		Slew restrictors will be in place and correctly set for the application. These will be checked as part of the crane pre-start inspections. Lift plans will include hold points that require sign off by the Appointed Person.		
		Any lifting operation above 85% of the cranes rated capacity must not start without the written approval of the Rail Construction Manager	Civil Works Construction Manager	Sign off on lifting plan

	Reference documents	How will we meet the expectation? (Minimum requirements)	Responsible person	Deliverables
		All mobile crane lifts above 75% of the rated capacity and or multiple crane lifts will be risk assessed. A lift plan developed in accordance with AS 2550 which will be approved by the Rail Construction Manager or Appointed person.	Civil Works Construction Manager	Sign off on lifting plan Work pack SWMS
	E-C-8-0520c Mobile, Crawler Crane Check sheet	All mobile cranes will be fitted with a rated capacity limiter with external visual indicators (Christmas tree lights). Non-conductive tag lines or equivalent must be used to control loads being handled/moved by lifting equipment, to ensure workers remain clear of any suspended load. Crane safe certification must be verified along with pre-mobilisation check sheets E-C-8-0520c Mobile, Crawler Crane Check Sheet.	Civil Works Construction Manager or delegate Plant Manager (Select)	Pre-mobilisation checks

7. Interface management

The objective of the MetCONNX interface management process is to maintain safety and minimise impacts on the operation of road and rail services, the travelling and general public, and other interface parties.

Construction interfaces primarily consist of shared access and haulage routes, program and timing of works by others, Approvals and Possession management. These interfaces will be managed by weekly interface meetings with other parties for the benefit of the program as a whole.

7.1 Communication

The key to interface management is effective communication processes with all authorities, other contractors and adjacent stakeholders throughout the course of the Project. MetCONNX will employ a dedicated Stakeholder and Community Manager who will ensure that effective communication and consultation through regular correspondence, meetings and reports is established and maintained. A Project Coordination Group is proposed to be established to facilitate effective communication between all interfacing entities.

7.2 Interface coordination and planning

The Project delivery program and methodology have been developed to minimise actual and potential impacts on interfacing parties. For example, in constructing the cable routes on PTA property, we have planned the work progressively in stages to minimise our area of occupation on a day-to-day basis while also reducing the potential for stakeholder disruption.

MetCONNX will continue to develop our detailed construction plans for the Project in consultation with key stakeholders and will ensure that the construction rationale and intent is effectively communicated and understood. Any residual issues, concerns, timing or access constraints will be accommodated within the final methodology and program.

7.2.1 Public authorities

Management of the interfaces with public authorities primarily concerns consents/permits and (technical) discussions to attain formal approval. The Stakeholder and Community Manager will liaise with the relevant participants to coordinate with the authorities and facilitate approvals, consents, site access and permits throughout the various project stages. They will coordinate these activities including the preliminary discussions and follow-up and track the consent process.

Early discussions with the relevant groups are proposed to inform the authority about the planned activities, agree mutually on expectations and the followed execution and timeframe of the approval cycle. Authorities and other stakeholders to be approached by MetCONNX include the following:

- Existing railway system or network operators through the PTA's Client Representative
- Services/utility providers (i.e., Western Power/Telstra)
- Local government authorities
- Local council urban planning authorities
- Department of Planning, Lands and Heritage
- Department of Water and Environmental Regulation
- Main Roads WA
- General public.

Management of approvals and permits will be undertaken by the Interface and Sitewide Services Lead in conjunction with the Project Technical Lead with reference to the overall Project program. This will minimise the risk of delayed approvals and to the start of the construction phases.

7.2.2 Works directly affecting stakeholders

Works directly affecting stakeholders will be constructed in accordance with the agreed designs and construction plans. We will review our performance regularly with affected parties to ensure we continue to minimise our impact on their ongoing operations. Any changes will be discussed and agreed with the other parties as part of the ongoing consultation process.

Detailed methodology and working hours will be agreed with each affected stakeholder and works will be constructed strictly in accordance with those agreements. Affected work areas will be reduced through a staged approach, clearly demarcated and fenced. Traffic management plans will be developed to ensure the safety of the affected public and road users and ensure selected plant and equipment is fit for purpose.

A stakeholder management plan will be developed which outlines the potential impacts to nearby stakeholders during different construction activities and the detailed measures we will incorporate to mitigate these impacts.

7.3 Emergency preparedness and response

The HSE Manager will establish an Emergency Management Plan for the Project that details emergency procedures for preventing and mitigating potential emergencies. Emergency preparedness must be tested within the first six weeks of the start of construction works and then at least every four months from then on. All site emergencies – actual or practice/drill – must be documented using Emergency Response Drill Record (E-T-8-0997) and any actions taken where improvements are identified.

MetCONNX will review, and revise where necessary, their emergency preparedness and response procedures following the practice or the occurrence of Incidents. Refer to the Safety Management Plan (R30-MET-PLN-SA-000-00001) for further details.

8. Environmental Management

8.1 Environmental Assessment Overview

The Byford Rail Extension project contains complex environmental factors. The project was referred to and assessed by the WA Environmental Protection Authority through Public Environmental Review under Part IV of the *Environmental Protection Act 1986* (WA).

The EPA's Public Environmental Review process involved Environmental Impact Assessment of the project's Environmental Review Documentation which included environmental studies and management plans. During EPA's assessment, the Environmental Review Documentation was made available for public comment.

Key issues identified include:

- Flora and vegetation
- Terrestrial fauna
- Inland waters
- Social surroundings
- Aboriginal Heritage

The proposal and its management actions were deemed environmentally acceptable, subject to conditions and received Ministerial Approval on 1 Feb 2022. Conditions of EPA Ministerial Approval "Ministerial Statement 1183" can be found on EPA's website:
https://www.epa.wa.gov.au/sites/default/files/Ministerial_Statement/1710%20Statement%201183%20for%20publishing%20-%20Byford%20Rail%20Extension.pdf

The entire details of the assessment are public record on EPA's website:
https://www.epa.wa.gov.au/proposals/byford-rail-extension

The location of the Byford Rail Extension contains vegetation and fauna matters of national significance which were assessed by the EPA, and approval granted by the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). Conditions of the EPBC Act approval "EPBC 2020/8764" can be found on the EPBC Act Public notices page:
http://epbcnotices.environment.gov.au/_entity/annotation/1db525c8-9388-ec11-80d1-00505684c137/a71d58ad-4cba-48b6-8dab-f3091fc31cd5?t=1676856935181

Matters concerned with the EP Act and EPBC Act approvals therefore are regulated by the state and federal government.

Aboriginal Heritage Surveys have been completed and Whadjuk and Gnaala Karla Booja representatives have given their support for the project. See link for a copy of the report.

https://www.epa.wa.gov.au/sites/default/files/PER_documentation2/Appendix%20O%20-%20Redacted%20-%20Final%20BRE%20Aboriginal%20Heritage%20Survey%202020_Redacted.pdf

Approval was granted by the Minister of Aboriginal Affairs under s18 of the *Aboriginal Heritage Act 1972* on 21 April 2022. The s18 approval permits disturbance of registered Aboriginal heritage site 'Wungong Brook'. Under this approval, Aboriginal Heritage Monitoring of ground disturbing works; and annual reporting describing the extent of any impacts to the heritage site to the Registrar of Aboriginal Sites must occur. Furthermore, commitment was made to engage Aboriginal Monitors for works undertaken Near Harber Rd Armadale and Byford Station and follow an unexpected finds procedure for all other works.

Viaduct Constraints, Tree Retention and Clearing

The Viaduct works area consists of significant native fauna habitat, flora species and vegetation complexes and is a section that has received ongoing, in-depth planning and redesign to minimise disturbance.

Additional to preserving the amenity, the EP Act and EPBC Act approvals contain stringent vegetation clearing limits and environmental protection measures.

Constraints at Viaduct location

- Works to be contained within the "Development Envelope" which is otherwise known as the Environmental Boundary
- Legal access
- Guildford Vegetation Complex
- Neerigen Brook
- Black Cockatoo breeding trees and foraging habitat
- Armadale Heritage Tree Trail

Retention status

Tree clearing numbers for the construction of the Viaduct have are outlined in the draft "Tree Retention Strategy" document which is submitted as part of the development application. Minor redesign of permanent works and construction areas is underway for the purpose of tree retention. Initial tree loss counts consist of approximately 41 x Black Cockatoo Habitat trees being removed or pruned for permanent structure works, and an additional 6 being lost for temporary works. These trees consist of Corymbia calophylla (Marri), Corymbia citriodora, Eucalyptus rudis, Eucalyptus marginata, Eucalyptus Wandoo.

About 75% of the project area is clear of native vegetation and the remaining 25% has been classified as completely degraded.

Retention actions

A tree retention plan is currently being developed by a qualified Arborist and a draft version has been submitted as part of this Development application. The viaduct is subject to early Tree Retention planning, and every tree identified for removal has been questioned. This has led to ongoing redesign of the temporary works area, and changes to the permanent works design.

Review and recalculation of clearing area is conducted on a weekly basis. This is an important action to ensure compliance with very constricted clearing conditions. This will be an ongoing action until all clearing activities are complete.

The review of the viaduct clearing requirements concentrates on two areas of concern:

1. Protecting as many large trees as possible on Aragon Court, especially the large Eucalyptus rudis which is part of the Armadale Heritage Tree Walk and
2. Protecting as many native trees and verge trees as possible to retain the treescape aesthetics of the area.

Other tree retention actions include, but not limited to:

- Trees and other vegetation subject to retention will be surveyed, marked and fenced off to prevent accidental removal. Training and special instructions are provided to contractors each morning during pre-start and the importance of tree retention will be a key message. Internal clearing permits which contain environmental checks and hold points are approved by the Environmental Manager prior to any clearing activity.
- Transplanting at least 600 Grass Trees taken from the clearing area and moved to the Armadale and Byford Stations and precincts.
- Arborist to advise of the ability to prune trees instead of complete removal in the case of trees being very close to a clearing boundary.
- Rehabilitation and replanting of vegetation.

- Project target to obtain the Infrastructure Sustainability Council (ISC) ecology credit.

Conservation Studies and Offsets

An Offset Management Plan has been provided to the EPA for approval in accordance with conditions 6-3 and 6-4 of Ministerial Statement 1183. The plan contains measures to tangibly improve the environmental values at the offset locations:

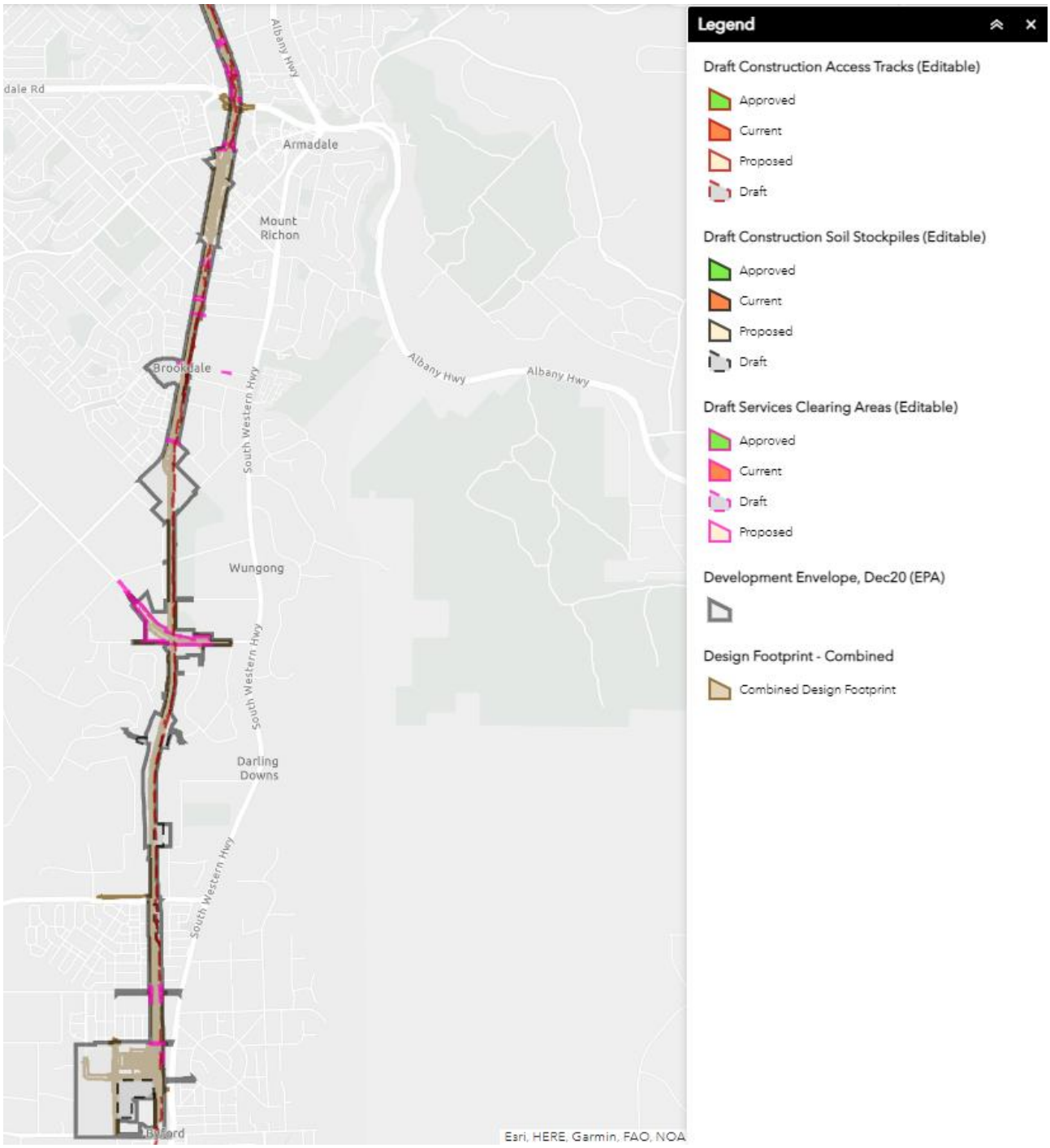
Environmental value	Offset location	Extent of location to receive offset measures
SCP3a *Corymbia calophylla - Kingia australis* woodlands on heavy soils, Swan Coastal Plain	Lambert Lane Nature Reserve (Figure 2)	At least 3.3 ha
	Brickwood Reserve (Figure 3)	At least 6.5 ha
SCP3c *Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain	Roman Road Nature Reserve (Figure 4)	At least 3.0 ha
Guildford Complex	Lowlands Nature Reserve (Figure 5)	4.4 ha
Bush Forever	Lambert Lane Nature Reserve (Figure 2)	3.1 ha
Moderate to high and high quality Carnaby's cockatoo foraging habitat	Lowlands Nature Reserve (Figure 6)	At least 47.05 ha
Moderate to high quality forest red-tailed black cockatoo foraging habitat	Lowlands Nature Reserve (Figure 7)	At least 76.8 ha
Moderate quality Baudin's cockatoo foraging habitat	Lowlands Nature Reserve (Figure 8)	At least 70.6 ha
Black cockatoo potential breeding trees	Lowlands Nature Reserve (Figure 9)	417 trees
Conservation Category Wetlands	Lambert Lane Nature Reserve (Figure 2)	3.6 ha
	Brickwood Reserve (Figure 3)	4.2 ha

Table 1 Environmental Offsets

Clearing

Vegetation will be cleared within the limits and in accordance with the conditions imposed in the EPA and EPBC Act approvals. As mentioned above, clearing areas are currently under review however indicative clearing area as of January 2023 are depicted within the areas marked up below.

DRAFT permanent and temporary works area, and location of Black Cockatoo breeding trees are depicted in the images below (image from ArcGIS, 5 April 2023, subject to review).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Approved
Current
Proposed
Draft
Draft Construction Soil Stockpiles (Editable)
Approved
Current
Proposed
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Draft Services Clearing Areas (Editable)
Approved
Current
Draft
Proposed
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Design Footprint - Combined
Combined Design Footprint
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Albany Hwy
Armadale
Mount Richon
Brookdale
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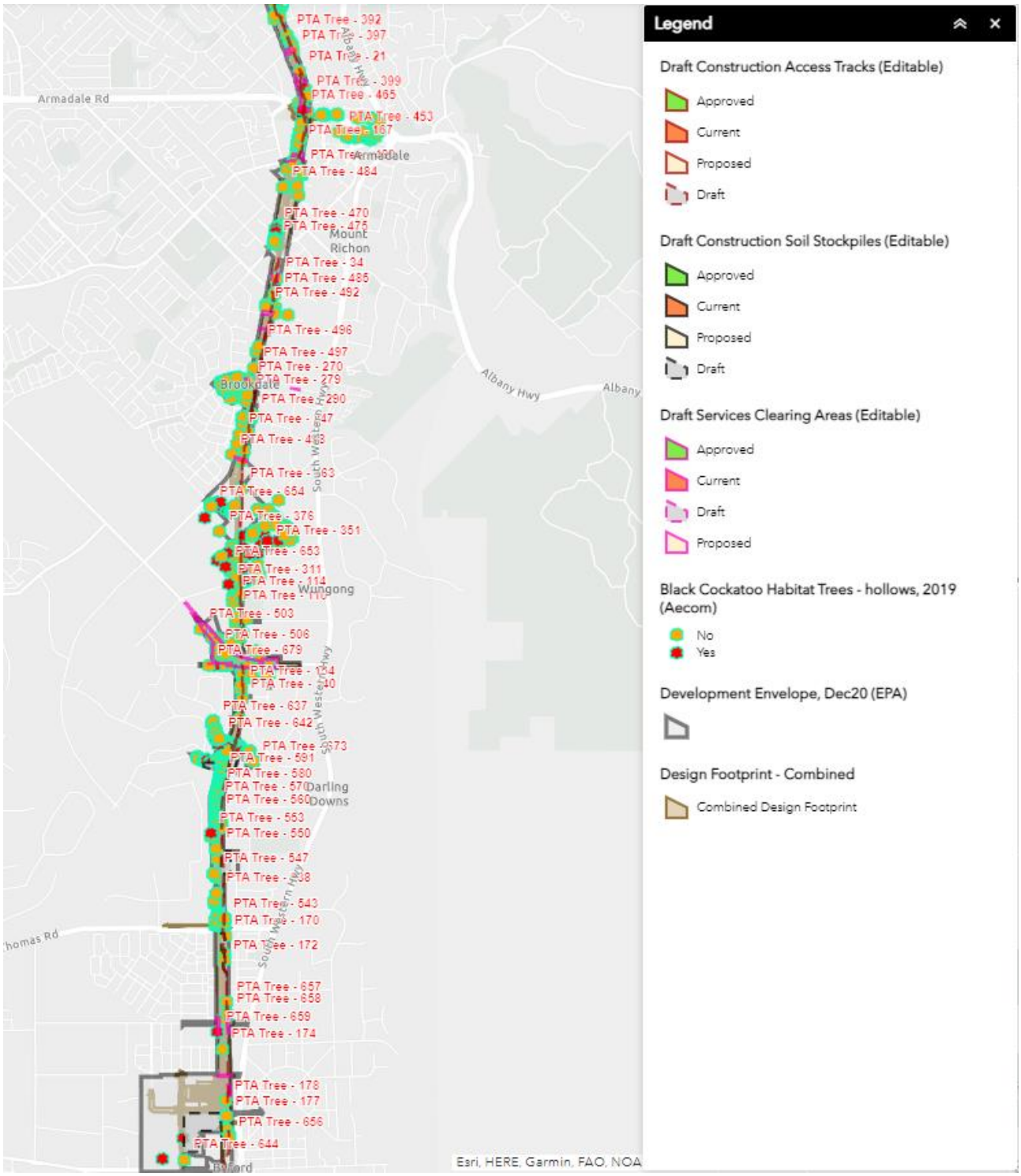
Wungong
South Western Hwy
Darling Downs
South Western Hwy
Byford
Esri, HERE, Garmin, FAO, NOA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Draft Services Clearing Areas (Editable)
Approved
Current
Draft
Proposed
Black Cockatoo Habitat Trees - hollows, 2019 (Aecom)
No
Yes
Development Envelope, Dec20 (EPA)
Design Footprint - Combined
Combined Design Footprint
Armadale Rd
Albany Hwy
Albany
Mount Richon
Brookdale
Wungong
Darling Downs
South Western Hwy
Esri, HERE, Garmin, FAO, NOA

Communication with the City of Armadale – clearing

Metconnx is committed to early engagement with the City of Armadale regarding tree retention and clearing. The City of Armadale has been a key stakeholder in the preparation of the Tree Retention Strategy, gathering early information on trees of significance. Further, a consultation process has been built into the internal clearing permit system, whereby the City of Armadale are afforded to 2 weeks notification prior to any clearing undertaken within the City's confines. The purpose of the notification is to ensure that the City of Armadale are aware of any clearing in advance, to enable improved complaints management. The notification is also an important part of tree retention planning, affording the City of Armadale a final opportunity to make comment on any trees of significance that may have been missed during the preparation of the Tree Retention Strategy.

8.2 Environmental emergency management

Environmental incidents are likely to occur on the Project given its complexities and duration. The Project's Environmental Team will be responsible for minimising these incidents through education, sharing information and providing field leadership to supervisors, managers and subcontractors. Emergency contact numbers for environmental incidents will be displayed in prominent locations. Emergency Services contact numbers will also be displayed in the main site offices.

The PTA and relevant statutory and regulatory authorities such as the DWER and EPA will also be informed as necessary for a Class 1 environmental incident. Environmental emergencies will be managed as specified in the Laing O'Rourke HSEMS System Requirement – Emergency Planning and Response. More detailed information is provided in the Construction Environmental Management Plan.

8.3 Flora Controls & Actions for Armadale Viaduct Area & Wider Project Area

The following environmental controls and management measures will be applicable for the Armadale Viaduct area:

- Development Envelope and Project Footprint to be marked on all design drawings as site boundaries
- No land clearing or ground disturbance work is to be undertaken until a Ground Disturbance Permit has been signed and issued
- Prior to commencement of construction or clearing activities, the Alliance will install temporary barriers or flagging to define the boundary of the development footprint. Signage will be erected indicating that the areas fenced/flagged off are not to be entered or disturbed
- Vegetation Retention Areas will be clearly marked with barriers or flagging with signage indicating that the areas fenced/flagged off are not to be entered or disturbed
- Areas containing TEC will not be used for laydown and temporary construction purposes
- Project disturbance footprint to utilise highly modified areas to minimise impacts to important fauna habitat and ecological communities
- Project disturbance footprint to avoid clearing within the boundary of the known population of threatened flora (*Diuris purdiei)*
- Project disturbance footprint to avoid clearing within the boundary of the eastern population of Pygmy Sundew (*Drosera oreopodion)*
- Adopt a minimum separation distance of at least 50 m, and as far as practicable 100 m, between the proposed construction water supply bores and TEC 3a occurrences
- Significant flora / vegetation will be mapped and marked on site and avoided where possible during clearing (exclusion zones)
- Construction tracks designed to coincide with existing tracks or aligned along cleared areas wherever practicable

- Vegetation clearing will be kept to as minimal as practical
- Clearing will take place immediately prior to the area being required (ha)
- Topsoil will be stockpiled for use in revegetation
- Vegetation and topsoil stockpiles will be segregated according to its weeds and/or disease status
- Dewatering and abstraction for construction water will be undertaken in accordance with government approvals/licensing and extraction does not exceed licensing limits
- Dewatering/abstraction shall be undertaken in a manner or at a rate which minimises the risk of indirect impacts to wetland vegetation and/or Banksia Woodlands TEC/PEC
- Dewatered effluent and excess water shall not be directly discharged to surface water bodies including Conservation Category and Resource Enhancement Wetlands
- All construction personnel will receive training on the importance of adherence to clearing limits and boundaries
- The Alliance will keep a register of all areas which have been cleared
- Vegetation reuse including liaison with and provision of material to Kaarakin Black Cockatoo Conservation Centre (Kaarakin) and Landcare Shire of Serpentine Jarrahdale, retention and reuse of tree hollows including liaison with environmental Regulators for reuse opportunities nearby etc
- Dieback and weed management (including hygiene protocols consistent with the Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia, Part 2 National Best Practice Guidelines and a weed control and management measures to prevent the introduction or spread of environmental weeds)
- Areas cleared for the Proposal will be revegetated where not required for permanent infrastructure or management access and with consideration for operational safety requirements

8.4 Fauna Controls & Actions for Armadale Viaduct Area & Wider Project Area

- Feral/introduced fauna management – report and control during construction, removal of attractants
- Appropriately qualified, licenced and black cockatoo experienced terrestrial fauna spotter(s) will inspect all potential nesting trees with hollows within seven days prior to clearing of potential nesting trees (vendor is Natural Area Consulting Management Services)
- If black cockatoos are found to be using a hollow, a 10 m buffer radius will not be cleared around the tree until the hollows are no longer being used by the black cockatoos
- As required, install temporary exclusion zones for black cockatoo habitat where suitable nesting (actual or artificial) hollows are present within the Project Footprint
- Fauna specialist/s will conduct pre-clearing trapping and relocating of ground dwelling conservation significant fauna to neighbouring suitable habitat or locations confirmed with DBCA no more than seven days prior to clearing activities
- Directional clearing will be undertaken to allow fauna species present to move into adjacent areas
- During clearing activities, ensure the use of appropriately qualified and licensed terrestrial fauna spotters
- Kangaroo proof fencing will be installed where required to prevent access to the site during construction and operation by kangaroos and wallabies
- All construction personnel will receive training on the importance of adherence to clearing limits and boundaries
- Vegetation to be cleared will be searched by a fauna specialist prior to clearing and any fauna species found will be relocated
- Trees to be retained will be identified and flagged prior to clearing, where necessary including protection zones
- Fauna mortality from construction activities or vehicle strike will be documented during construction and reported to the Department of Biodiversity, Conservation and Attractions. Where the species

concerned is a matter of national environmental significance, the Department of Climate Change, Energy, the Environment and Water will also be informed
- Open trenches will be inspected twice daily, and any trapped fauna removed by an appropriately qualified person, egress points and fauna refuges will be provided at intervals not exceeding 50 m
- Installation of a 300 mm to 1500 mm culvert crossing at natural ground level to facilitate fauna movement between east and west habitat areas – final design, however staging may consider movement of fauna during construction
- Speed limits will be in place during construction to minimise native fauna mortality from vehicle strikes
- Areas cleared for the Proposal will be revegetated where not required for permanent infrastructure or management access and with consideration for operational safety requirements

9. Overall site methodology

9.1 Purpose and scope

The purpose of this section is to provide an overall understanding of how the works will be delivered, including project sequence, general methodology, dependencies, and timing. The scope applies to the Works for the BRE Project.

9.1.1 Dilapidation survey

Prior to demolition and excavation works commencing on-site, a dilapidation survey will be commissioned 100m beyond the works area in accordance with the SWTC to document existing conditions of adjoining properties and infrastructure. A re-inspection post Project completion will also be commissioned to assess conditions against those reported before works commenced.

9.1.1.1 Third party property and public amenities

In alignment with planned site access and the Stakeholder Interface Management Plan, the Stakeholder and Community Manager is the nominated relationship owner for all interactions with local government authorities (LGA). As a result, within the Project planning process, the Stakeholder Interface Lead and the Early Works Construction Lead and the Main Works Construction Lead, are accountable for identifying and recording any public amenities that may be affected by the Works. The location and standard of the amenities will be recorded in the stakeholder database and a replacement strategy will be determined and agreed with the relevant LGA.

Similarly, for private property the Stakeholder Interface Lead is the nominated relationship owner for all interactions. As a result, within the pre-condition survey process, the Stakeholder and Community Manager and the Early Works and Main Works Construction Leads, will be accountable for identifying and recording any potential required modifications to property owner assets. It is understood that any modification of reticulation, bores, drainage and garden fixtures must be of the equivalent standard to that existing prior to the commencement of the Works. The implementation of any required works will be governed by the post-project survey process.

9.1.1.2 Access and approvals

MetCONNX will obtain permission for site access to all work areas from the relevant stakeholders prior to commencing construction works. All environmental, LGA and rail authority approvals (outside of what PTA are obtaining) shall be gained prior to construction works commencing on-site. Stakeholder liaison prior to and throughout the construction works, all relevant stakeholders will be kept up to date with progression of the works. Any notable changes to the design shall also be conveyed using notification procedures are detailed in the Stakeholder Interface Management.

9.1.2 Site establishment and traffic management

Individual programs for site mobilisation and demobilisation of site facilities will be prepared in greater detail. This will ensure both phases are carried out as efficiently as possible

MetCONNX will stage and construct works whereby access to PTA and Main Roads infrastructure, for their maintenance and inspection requirements, will be unhindered during the life of the Project for both PTA and Main Roads. The Stakeholder Interface Lead will liaise directly between the Project and individual asset owners so both parties are aware of activities undertaken that may affect either party.

Figure 3: Project office and site facilities locations

Plans will be established to minimise disruption to Perth's public transport network. The Traffic Management Plan can be found in Appendix E: Traffic Management Plan.

The Traffic Management Plan will ensure:

- Existing PShPs are maintained, or alternative sealed pathways are provided of a 2.0m minimum width
- Temporary PShPs where required will have secure fencing and appropriate lighting
- Security to adjacent properties
- Construction personnel will be encouraged to use public transport where possible
- Construction personnel's vehicles or construction vehicles are to park only in designated parking bays within the construction site and not use public or Transperth parking bays

During the next stages a detailed Transport and Traffic Management Plan and Traffic Management Staging Plans will be developed to cover all project traffic management, external vehicle management (public and emergency) and pedestrian movements.

9.1.2.1 Council approvals, transplanting and protection works

Approval will be obtained for any works involving flora and fauna, council infrastructure or traffic management requirements, before starting site establishment. Refer t

9.1.2.2 Public utilities and services

Services searches will be undertaken as necessary to identify the exact location of services. Service location points will be sketched on the site layout drawing. All utilities located in the work area will be identified by MetCONNX before the start of Works. If required, MetCONNX will be responsible for any

temporary utility protection, diversion and reinstatement and all coordination works with the utility companies.

9.1.2.3 Hoardings, fencing and gates

Where possible, the existing rail corridor fence will be utilised. Where this is not possible, chain link fencing with shade cloth or concrete barriers with screens will be erected to screen the work area and prevent unauthorised access and risk to third parties. The site fencing, hoarding and gates will be properly maintained, and suitable warning signs will be displayed to deter unauthorised entry. Wheel washes will be provided at site exits where spoil materials are to be removed to prevent mud from being carried on to public roads. A street sweeper will be on call to clean up mud inadvertently tracked on public streets.

MetCONNX will ensure that all existing access points into adjacent properties that adjoin the Project boundary will be maintained as operational. This includes the existing Rail corridor boundary gates and maintenance access roads. If any of these access points are temporarily required to be impacted by the Works, it will be negotiated with the relevant parties and agreed before any access alteration is executed.

If MetCONNX installs any temporary artworks they shall be consistent with the Project branding, provide wayfinding, and shall be approved by the PTA's Representative. In addition to this, all temporary fencing and hoardings shall comply to all relevant PTA standards and Codes of Practice, including the Earthing and Bonding Specification.

9.1.2.4 Site security

Adequate site security is important for the safe and successful execution of the Project. A major security feature is the fact that the site comprises several areas instead of one complete site boundary. Some areas are located in close proximity to existing buildings including residential areas. Security management will focus on:

- Preventing unauthorised access to the Works areas for public safety
- Preventing theft of plant, equipment or other property
- Preventing malicious vandalism of plant, equipment or other property
- Ensuring that only workers who have completed the required safety training and certification and have been issued with valid site access are allowed to access Works areas
- Controlling traffic into and out of the Works areas to avoid disturbance to existing road users
- Controlling vehicles, plant or equipment leaving the Works areas.

9.1.2.5 Anti-graffiti control

All temporary site facilities including site sheds, will be maintained free of graffiti and covered or removed within the time limits as set out in the SWTC, in accordance with the PTA's and the Government's graffiti removal policy.

9.1.2.6 Site lighting

General lighting will be provided within the site to facilitate night shifts. Site lighting will be set up to minimise impacts on nearby residents and road users. These will be fixed units attached to the buildings or mounted on lighting poles and will be run using the temporary power available at the facilities. Where required, additional task lighting will also be provided.

All Site lighting will be in accordance with the relevant Australian Standards: AS/NZS 1680.2.4:2017 Interior and workplace lighting – Part 2.4: Industrial tasks and processes.

Emergency lighting will also be installed for the areas where its required on site to assist workers to exit the workplace in an emergency situation. As per Section 2.7 of AS/NZS 3012:2010 Electrical installation – Construction and demolition sites, requires sufficient battery-powered lighting to be installed in stairways, passageways and next to switchboards. Backup powered lighting will be provided in areas on site which require it.

Emergency lighting and exit signage will be in accordance with:

- AS 2293.1-2018 Emergency lighting and exit signs for buildings – System design, installation and operation.
- AS 2293.3-2018 Emergency lighting and exit signs for buildings – Emergency luminaires and exit signs.

9.1.2.7 Site noticeboards

MetCONNX, in establishing its worksites and facilities, will ensure appropriate signage is installed covering:

- Project information for the general public
- Site access points
- Exclusion zones.

All signs will be to approved PTA signs and erected in advance of the Works commencing with information as agreed by the PTA. No advertising or information not approved by the PTA will be displayed with all signage removed within three months of completion.

At least two Project noticeboards and a number of site noticeboards will be installed in suitable locations at the main office facility and satellite compounds. The site noticeboards will be used to promote site safety and provide safety information to workers, including details of promotional campaigns, performance statistics and safety awards presented to individual workers. The Project noticeboards will provide all information pertaining to the Project and stakeholders.

9.1.2.8 Waste recycling

Waste collection services will be set up with bins for waste, steel and general construction waste. Recycling will be actively promoted to achieve the recycling targets. MetCONNX will set up a crew to maintain and manage waste recycling areas, silt fences and other general environmental initiatives and controls.

9.1.2.9 Water supply

At the beginning of the Project, applications will be made for a permanent water supply to the main site and all the satellite works areas requiring this service.

Where possible water used for construction purposes shall be obtained from sources other than Water Corporation water supply service, Conservation Category and Resource Enhancement Wetlands or surface water bodies unless it can be demonstrated to the satisfaction of the PTA's Client Representative that alternatives are not viable, and all required approvals have been obtained.

9.1.2.10 Temporary power

On handover of the sites to MetCONNX, an application for permanent power supply will be made to Western Power for all site areas requiring temporary power.

Before the supply of permanent power (or if permanent supply cannot be achieved), generators will be used as required. The generators will be inspected and checked before use to ensure the noise level

and exhausted gas comply with the statutory requirements. Emergency generators will be provided to power safety critical systems in the event of a main power supply failure.

9.1.2.11 Wastewater

The Project will generate wastewater from the ablution facilities that will be established on-site to accommodate the workforce during the construction phase. Holding tanks and a pump station will be set up on-site to collect, manage and discharge wastewater. Approval will be sought from the Water Corporation to connect to the existing sewer infrastructure. Where possible, gravity connections will be made. If these are not possible, either a pump or tank and sucker truck will be used.

All water including groundwater seepage captured within the Construction Site shall be treated and disposed of in accordance with the requirements of the relevant Government Agencies (e.g., Department of Water and Environmental Regulation). MetCONNX shall monitor the quality of water discharged from the Construction Site. Site drainage

Protective measures will be put in place to control soil erosion, stormwater run-off, washdown, wastewater or any other Project source that may have an impact on water quality and existing water courses. Scour protection, silt fences, hay bales and other components of stormwater management and treatment will be used during construction to minimise the impact on the surrounding environment.

9.1.2.12 Construction water management

Groundwater abstraction for construction water (suppression/conditioning) will require applications for the relevant licenses and construction of turkeys' nests where required. Sampling and monitoring of abstraction bores will be undertaken in accordance with the relevant plan. These will be produced and will align with the license requirements. Refer to the Construction Environmental Management Plan (R30-MET-PLN-EN-000-00001) for further details.

9.1.2.13 Construction Noise and Vibration

Construction noise and vibration limits controls and mitigation will be dealt with in the CEMP (R30-MET-PLN-EN-000-00001) and Noise Management Plan. All construction activities will comply with this document. MetCONNX shall select methods of construction and plant to minimise adverse noise and vibration impacts.

MetCONNX shall undertake condition surveys to establish the condition of adjoining properties, existing car park and bridge structures, existing site, existing signage, pedestrian paths, roads, services, existing station structures and other built items on sites and properties within 100 metres of the Works or Temporary Works before commencing any work. The surveys shall be carried out, where possible, in the presence of the owners or representatives of the owners of the items being surveyed and evidence of contact with such owners shall be retained and demonstrated.

MetCONNX will carry out a detailed vibration impact assessment based on the methods of construction, plant selected and prevailing site conditions. Based on the vibration impact assessment, controls and vibration monitoring will be implemented where required.

Following the vibration impact assessment, MetCONNX shall assess the adequacy of any existing condition surveys and carry out additional condition surveys to ensure that all property that may be impacted by vibration from the Works or Temporary Works has had a condition survey undertaken to establish the existing condition of such property.

Vibration monitoring equipment will meet the requirements of BS 5228-2:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration; BS 7385-2:1993 Evaluation and Measurement for Vibration in Buildings - to Damage Levels for Ground borne Vibration; and DIN 45669-1:2010 Measurement of Vibration Emission Part 1 Vibration Meters requirements and Tests, as applicable.

Where required MetCONNX will submit to the relevant authority for approval, a Noise Management Plan for out of hours work in accordance with the Environmental Protection (Noise) Regulations 1997 (WA) at least seven days before the work starts.

9.1.2.14 Demobilisation and site reinstatement

An individual program for site demobilisation of site facilities will be prepared in greater detail prior to works commencing. MetCONNX will reinstate and restore the worksites to a condition not less than that in existence immediately prior to gaining access to the worksites. This restoration will be carried out in compliance with the conditions set out in the Planning Approval and other conditions required by the relevant authorities.

9.1.2.15 Demolition

Numerous building and infrastructure need to be demolished for construction of the Project to occur. These are summarised as, but not limited to the following:

- Existing Armadale Station including Armadale Bus Interchange
- Various Rail assets including rail bridge at Neerigen Brook

All demolition will be undertaken in accordance with Laing O'Rourke's Safety Management System Fatal and Server Risk 10 (SFR 10) – Demolition.

Works will be undertaken by licenced contractors ensuring:

- Approved Demolition Plan is in place
- Compliance to all legislation
- Areas of demolition are securely fenced from public and protection
- All services are disconnected and capped where required at the boundary by approved contractor of the various service providers
- A level site will be left for the following stages of construction, backfilled with clean material compacted to a minimum of the surrounding ground
- The site will be free draining ensuring water runoff is into existing drains with appropriate settlement/silt ponds where required
- All structures are removed including ground slabs, footings, pile caps and tanks. Piles will be left in place and will be checked to ensure they do not clash with the new design
- Recyclable materials will be first removed to a PTA nominated location or accredited recycling facilities
- Remaining demolished materials will be removed from site and disposed at approved waste sites
- No materials will be burnt or buried
- Prevention of encroachment of demolished materials onto adjoining properties, including public space
- Protect/cover existing plant/materials/equipment intended for re-use
- Minimised dust arising from demolition through control by watering, dust-proof screens, partition walls, bulkheads and covers or other approved methods or combination of
- Staged demolition to ensure safety and structural integrity.

A demolition plan to the requirements of AS2601 – 2001 Demolition of Structures will be developed covering each site and address items such as:

- Relevant Australian Standards, Codes, Regulations and Guides covering but not limited to:
  - Occupational Health and Safety Act, Regulations and Guidelines
  - PTA requirements
  - AS 2601-2001 Demolition of Structures
  - Asbestos: Code of practice and Guidance Note
  - Department of Occupational Health and Safety of WA – A Guide for the safe removal of Asbestos cement building products
  - National Occupational Health and Safety Commission – Code of Practice for the Safe Removal of Asbestos.
- Site access and fencing/hoarding/adjacent properties/lighting/pedestrian management
- Training and competency requirement
- Licences
- Authorities and notifications
- Protection/Traffic Management
- Risk Assessment
- Dilapidation of adjacent infrastructure – photographed
- Methodology of demolition
- Pest and Vermin treatment
- Noise, Vibration and Air pollutants
- Recyclable materials and artifacts
- Hazardous materials such as Asbestos and Hydrocarbons
- Temporary works/Protection are designed and verified
- Protection of vegetation/trees not required to be removed
- Emergency Contacts for incidents or hazards (HAZMAT).

9.1.2.16 Construction Site Cleanliness

MetCONNX will ensure that the Construction Site, including the exterior of all perimeter fences/hoardings is maintained in a clean and tidy manner throughout the Works. Rubbish or loose items will be temporarily stored in the appropriate waste skip and disposed off site by an authorised waste/recycling organisation.

The Construction Site will meet the environmental sensitivity requirements and will ensure that all site personnel do not litter on or in proximity of the site.

9.1.3 Traffic Management

The construction of Armadale Viaduct will involve various temporary road closures and diversions to facilitate construction of the viaduct and local roads. The closure extents are detailed below but further detail can be found in both Appendix D: Staging Diagrams and in appendix E: Traffic management.

To deliver the works safely and minimise traffic impacts Metconnx have engaged Strada Consultants a competent and experienced local traffic management design consultant.

The following items were assessed as part of the planned road closure.

9.1.3.1 Project Details

Project Title	Byford Rail Extension
Location	Armadale Rail line corridor: Sherwood Station to Byford Town Centre. Road interface at the following level crossings: - Armadale Road. - Forrest Road/Third Road - Church Ave - Byron Road - Eleventh Road - Thomas Road (Currently under works by others) - Larsen Road - Abernethy Road
Road Classification, Existing Speed Limit	- Armadale Road: Primary Distributor/State Road, 70km/h - Forrest Road: District Distributor B, 60km/h - Third Road: Local Distributor, 40km/h - Church Avenue: District Distributor B, 50km/h - Byron Road: Local Distributor, 50km/h - Eleventh Road: District Distributor B, 80km/h - Larsen Road: Local Distributor, 50km/h - Abernethy Road: Local/Regional Distributor, 60km/h
Road Authority	City of Armadale, Shire of Serpentine Jarrahdale, MRWA
Local Government	City of Armadale, Shire of Serpentine Jarrahdale
Client	Public Transport Authority
Main Contractor	
Sub-Contractor	TBC
Scope of Works	- A new ground level Byford Station within the future Byford Town Centre, approximately 400 metres north of Abernethy Road, Byford. - Up to 600 passenger parking bays, new bus interchange and new pedestrian connection across the rail line accessible from the station. Reconfigured track alignment within the existing Armadale Station including an upgraded

	pedestrian overpass. A new platform for the Australind regional rail service at Armadale Station. - Thomas Road level crossing will be reconfigured to a road-over-rail bridge.
Staging of Works	Project will be delivered in a number of zones and the staging of these stages will be developed and detailed within task/area specific Traffic Control Plans (TCP)
Project Dates	Late 2022 to 2025
Hours/Days of Work	Monday to Saturday 7am to 7pm
Traffic Management Implementation	TBC
Project Duration	24 months
Site Constraints	The following constraints have been taken into consideration in the design of this TMP: - Live traffic on the adjacent local road networks - Volumes of traffic on existing routes (including effects from local schools, shopping centres, and recreational facilities) - Site access from local road network - Movement of special loads (OSOM Rail viaduct and structure components) - Construction activity requirements - SWTC requirements
Concurrent/Adjacent Works or Projects	None Known that directly interface.

9.1.3.2 Existing Traffic & Road Environment

Item	Description
Traffic Volume and Composition	**Armadale Road (east of level crossing)** 23,205 vehicles per day (East and westbound combined) Peak 0800-0900 (1130vph eastbound) Peak 1500-1600 (908vph westbound) 8.8% heavy vehicles. **Forrest Road (west of level crossing)** 8,013 vehicles per day (East and westbound combined) Peak 0800-0900 (424vph eastbound) Peak 1500-1600 (366vph westbound) 4.2% heavy vehicles. **Church Ave** No Data Available from MRWA Traffic Map.
Existing road configuration	**Armadale Road** Dual Carriageway - Dual lane per carriageway Arterial Road. **Forrest Road** Single Carriageway – Single lane per direction, legacy format Local Road. **Church Ave** Single Carriageway – Single/dual lane per direction, legacy format Local Road. **Byron Road** Single Carriageway – Single lane per direction, legacy format regional link Road.
Existing pedestrian / cyclist facilities	Various levels and availability of pedestrian and cycling facilities throughout the project, management of pedestrian and cycling facilities shall be detailed within works specific TCP's

9.1.3.3 Road Closures & Approximate Dates

There are 3 road crossings in Armadale viaduct area that will require intermittent closure during the works.

Forrest Road

Forrest road will require temporary closure during precast installation works for several night or weekend shifts. During these closures the intention is for a diversion to be in place through Church Avenue. The pedestrian path on the north side of Forrest Road will also be closed to facilitate piling works. There will also be road construction works at the Forrest Road to remove the redundant level crossing and reconstruct the road surface.

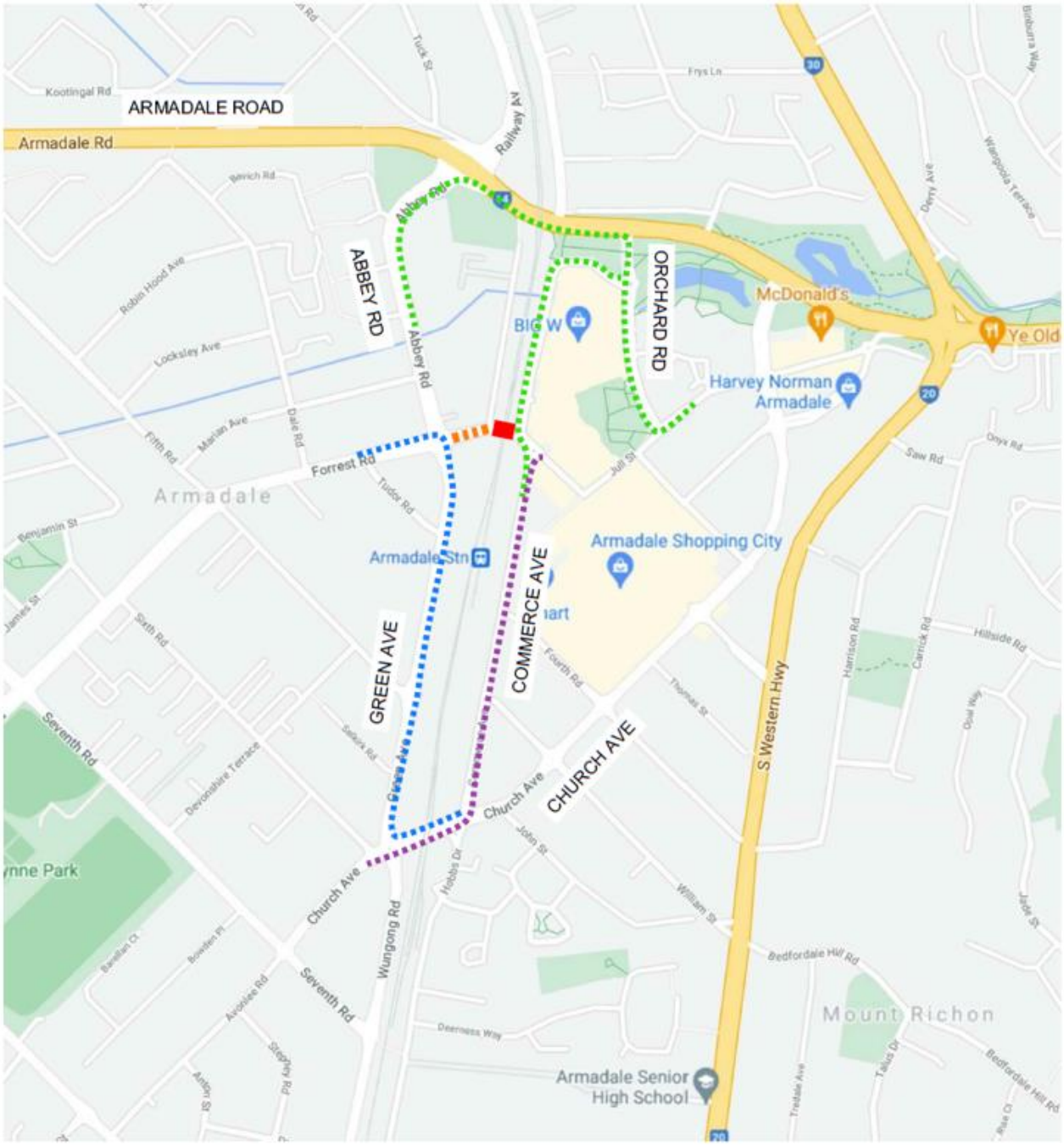


Figure 4: Diversion during Forrest Road Works

Church Avenue

Church Avenue will also require temporary closure during precast installation works for a number of nights or weekend shifts. During these closures the intention is for a diversion to be in place through Forrest Road. There will also be road construction works at the Church Avenue to remove the redundant level crossing and reconstruct the new road surface.

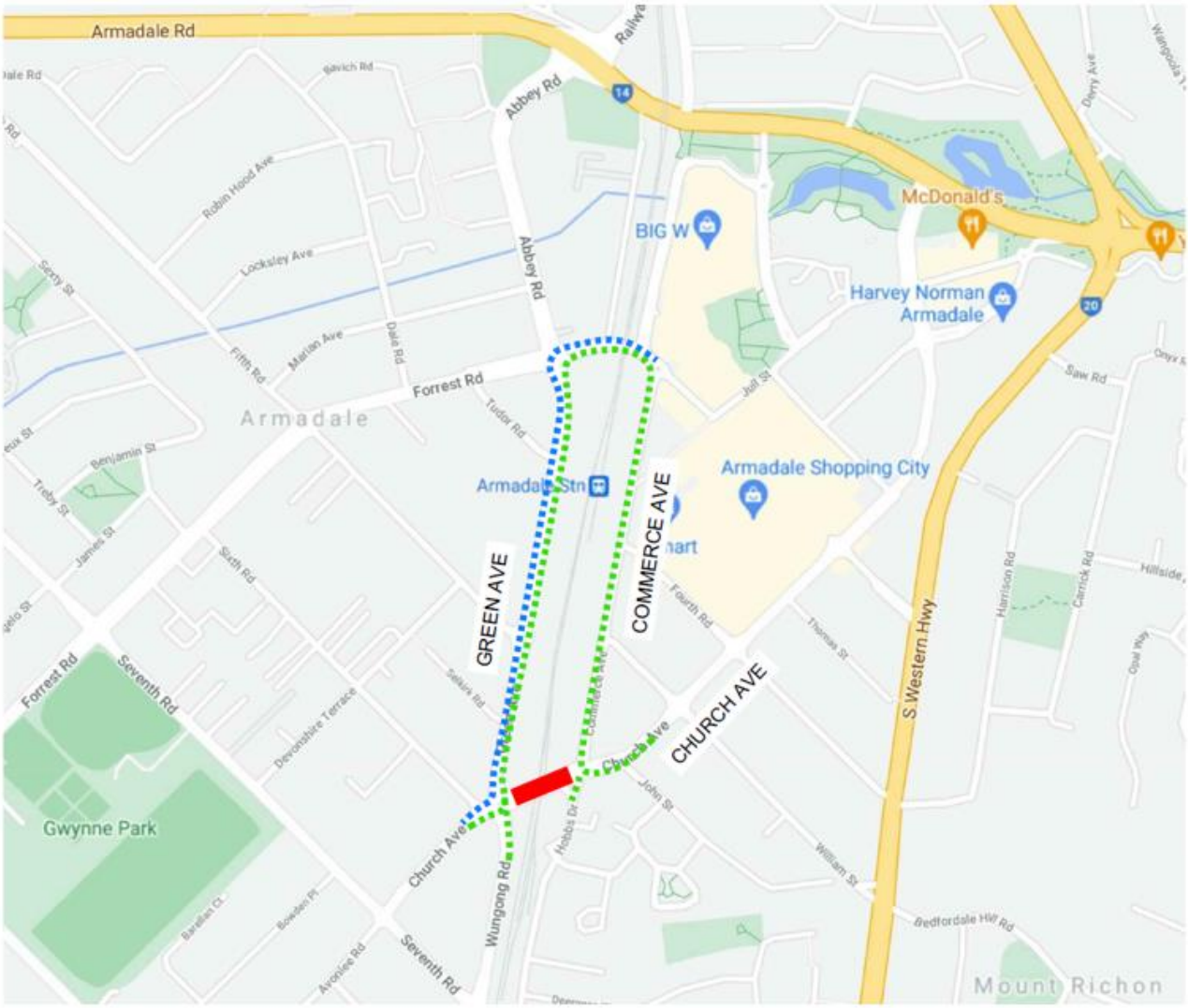


Figure 5: Diversion during Church Avenue Works

Armadale Road

To facilitate construction of the Viaduct, 2no. piers will be constructed on the existing Armadale Road. These will be a span support for the viaduct. During viaduct construction and Armadale Road reconstruction there will be a long term but temporary reduction of lanes on Armadale Road and intermittent short term (weekend or nightshift) closures to lift precast bridge beams over the road. The proposed single lane each direction traffic arrangement is show below.

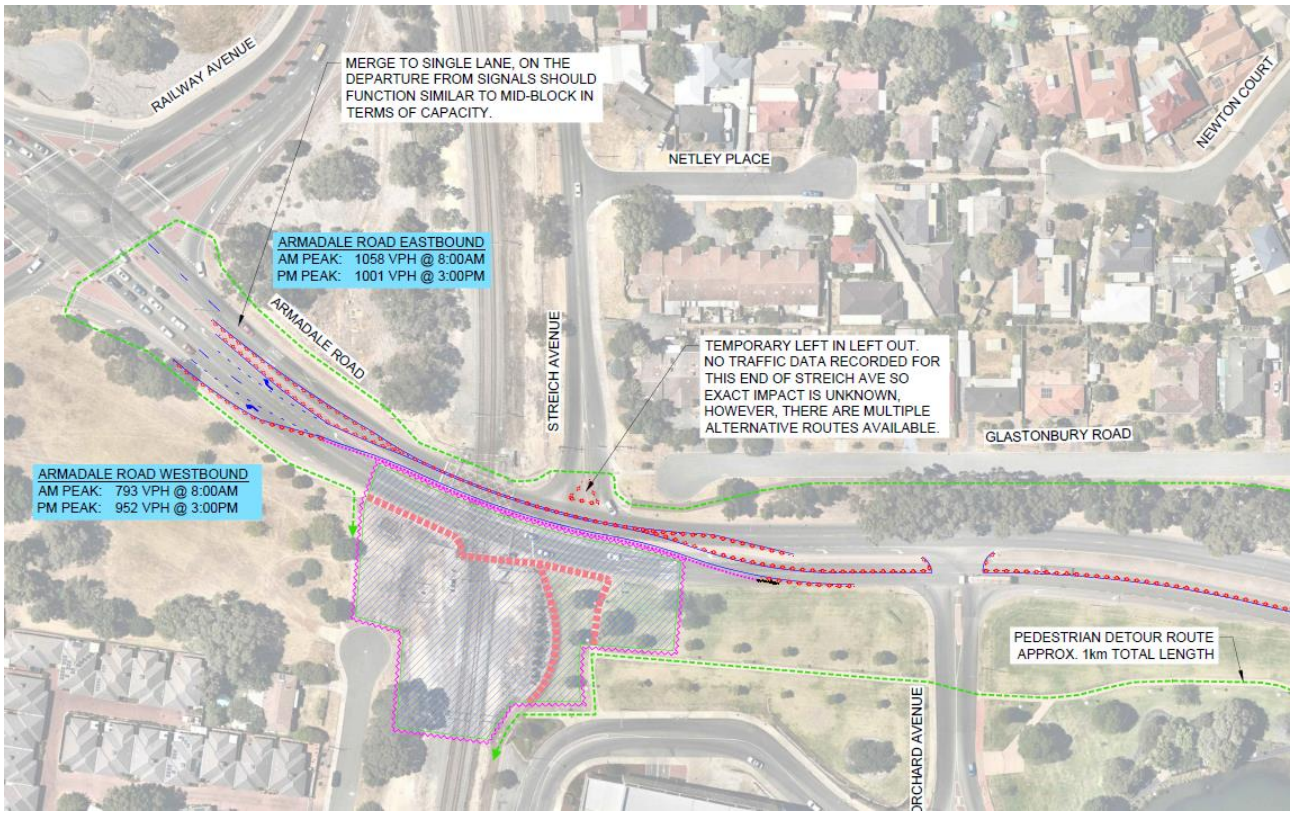
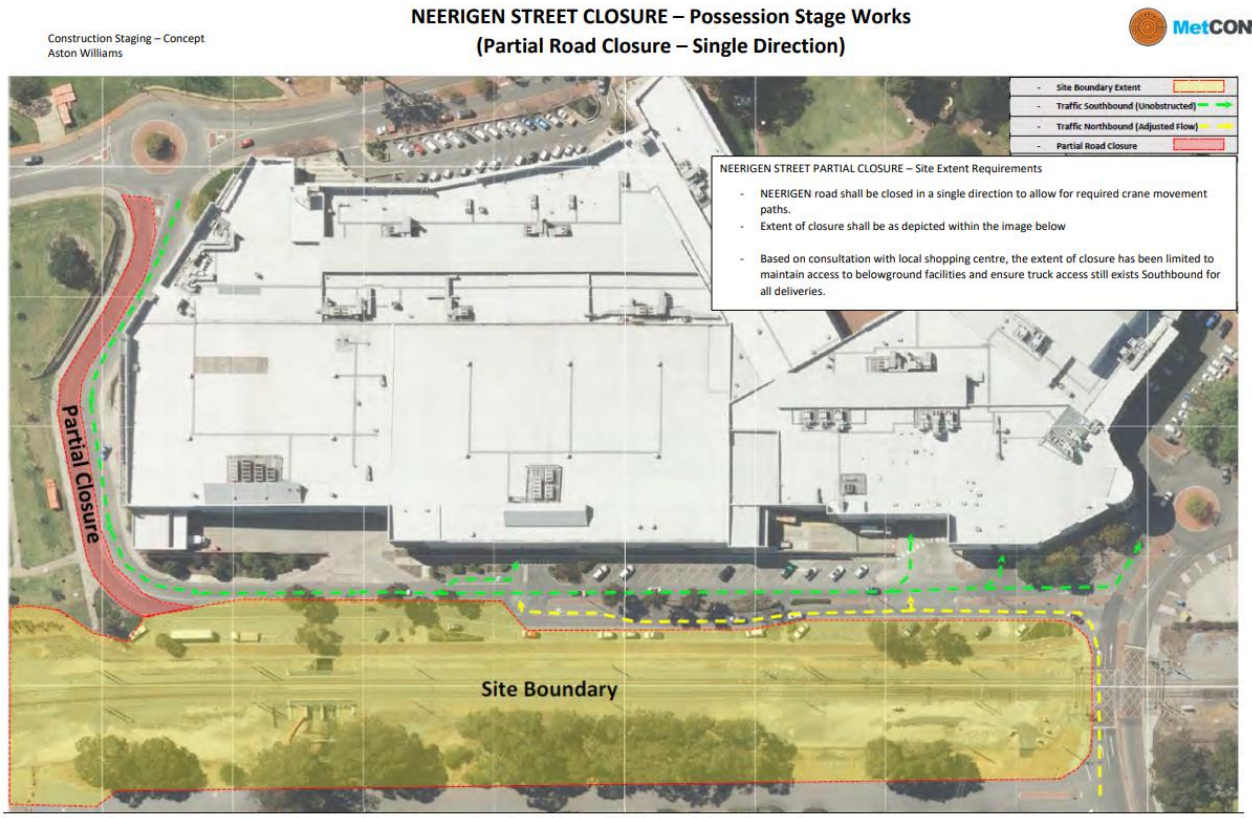


Figure 6: Diversion works at Armadale Road

Once pier construction is complete, civil and pavement works will progress on Armadale Road. This will involve several more traffic switches to facilitate works.

Neerigen Street Closure

There will also be other minor closures to Neerigen street. Neerigen road shall be closed in a single direction to allow for required crane movement paths. Extent of closure is as depicted within the image below. Based on consultation with local shopping centre, the extent of closure has been limited to maintain access to belowground facilities and ensure truck access still exists Southbound for all deliveries.



Construction Staging Concept
– NEERIGEN STREET Partial Closure –

9.1.4 Working hours

Construction works shall generally be between 0700 hours and 1900 hours Monday to Saturday (excluding public holidays). Possession works and traction power shutdown works will be 24/7 to minimise disruption to the PTA's commuters. The works will be carried out in accordance with noise control practices set out in Section 4.5 of AS 2436-2010 'Guide to Noise Control on Construction, Demolition and Maintenance Sites'.

In order to meet the required program, and minimise disruption to peak hour traffic, etc., construction works may be required to be undertaken outside of the above approved construction hours. These works include areas with traffic constraints or works in proximity to trafficked areas. Other activities may include bulk deliveries or installation.

The Community Engagement Plan details the notice to the PTA's Client Representative for approval before issuing notice to local government authorities (LGA), affected residents and/or businesses of construction works hours and any out of hours applications.

Emergency construction activities required to ensure/maintain the safe use of rail infrastructure and public roads, no loss of life, no damage to property, and no environmental harm may have to be undertaken outside of the approved working hours without prior approval from the PTA. Emergency out-of-hours works must be notified to the PTA as soon as practicable, with evidence of LGA notification.

9.1.4.1 Out of hours works

Construction outside of 0700 to 1900 hours Monday to Saturday (except public holidays) may be required from time to time to conduct scopes of work. These activities will be managed as out-of-hours works applications in accordance with Environmental Protection (Noise) Regulations 1997 WA for the

approval of the local government authority, DWER and subsequently by the PTA's Client Representative.

An Out of Hours Noise and Vibration Plan application must be submitted to the LGA seven days prior to the works being proposed to be undertaken and must include the following:

- Reasons for the work to be completed out of hours
- Proposed noise and/or vibratory activities
- Predictions of noise levels from the site
- Predictions/assurance of vibration levels from site
- Proposed measures to control noise and vibration
- Monitoring of noise and vibration
- Notifications to residents and stakeholders of upcoming out of hours work
- Complaint response procedure.

An Out of Hours Public Notification as part of an Out-of-Hours works application for the predictions of noise will provide an estimation of the potentially impacted premises. Occupants of nearby affected buildings likely to receive noise levels in excess of Assigned Noise Levels defined within Environmental Protection (Noise) Regulations 1997 (WA) must be advised (i.e. letter drop) at least 24 hours prior to work commencing. The notification must provide reasons as to why the work is necessary, reference to the LGA approval and contact details to register complaints.

9.1.4.2 Target exceedances and complaints

Where noise or vibration targets are reached or a complaint regarding nuisance levels are received, MetCONNX will investigate the cause or potential source. The investigation may include the deployment of monitoring equipment to measure noise or vibration levels to demonstrate compliance or alternatively the modification of the work methodology to reduce noise or vibration impacts. If noise or vibration levels are recorded in excess, the work must be modified to be conducted within allowable limits prior to continuing. Any recorded exceedances shall be provided to the PTA in the monthly environmental report.

9.2 Welfare facilities and offices

To support the Works, several site offices and welfare facilities will be provided along the project footprint. Each of these locations will comply with Laing O'Rourke's Primary Standard Site Establishment and as a minimum will provide:

- Toilets and showers
- Secure change rooms
- Cooking, eating and seating facilities
- Induction and training room
- First aid room
- Security gate houses on main site locations
- Sign on point.

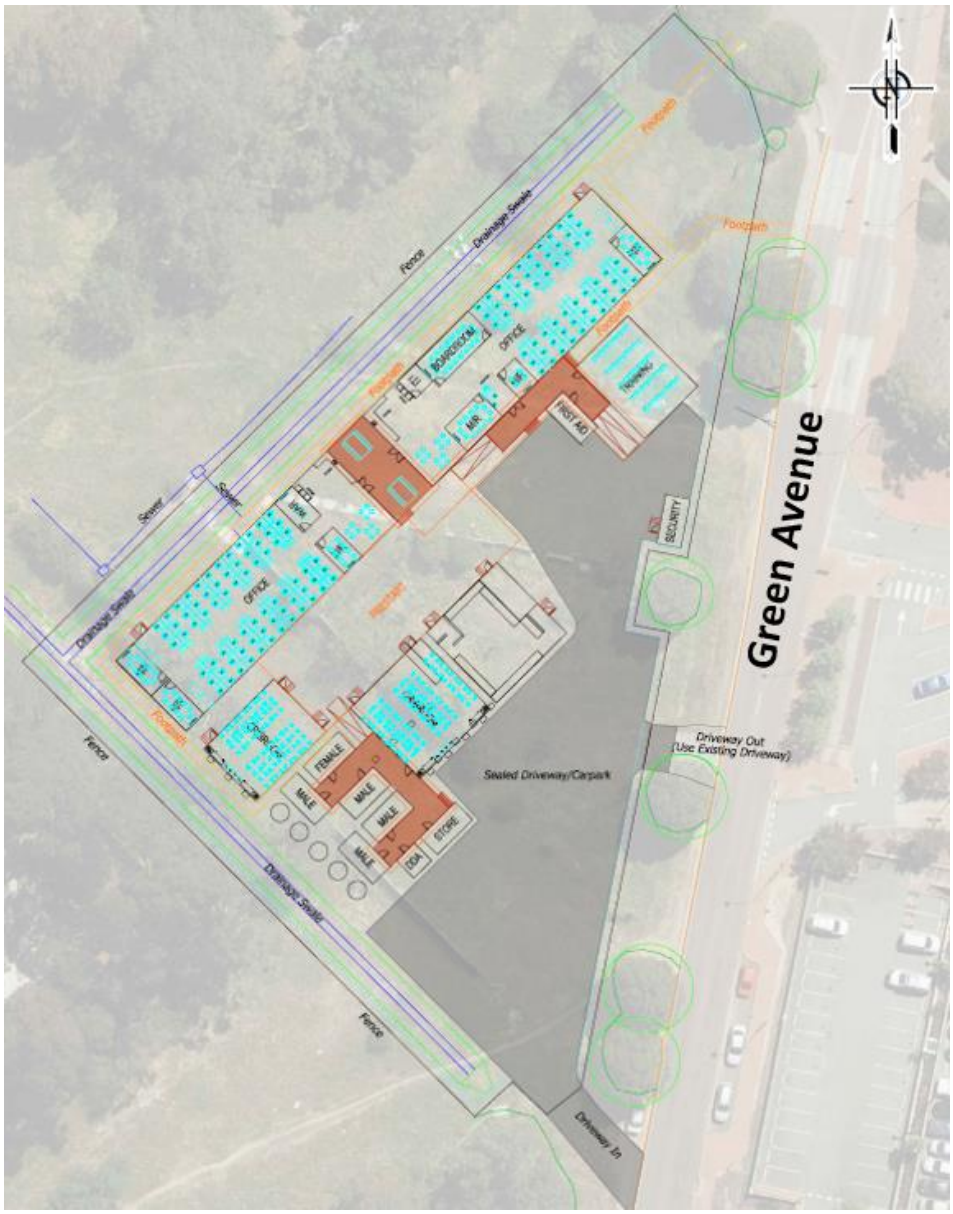

Green Avenue
Fence
Drainage Swale
Footpath
Sewer
OFFICE
BOARDROOM
MUR
FIRST AID
SECURITY
Driveway Out
(Use Existing Driveway)
Sealed Driveway/Carpark
FEMALE
MALE
STORE
Driveway In

Figure 7: Site facilities and office locations at Armadale

9.2.1 Armadale

The Armadale site office will form the main office where the majority of the MetCONNX delivery team will be located. It will also be the location for the main site induction and training facility. It will be located in the Northeast corner of the site in an area that only requires landscaping at the end of the Project. Welfare will also be provided to support the structural, civil and railway systems in the local vicinity along with the Station Precinct Work.

9.2.2 Telecommunications and data services

The Armadale site office will have high-speed fibre network pending service availability. If the service is unavailable, MetCONNX will work with all providers to find a suitable data communication service that is aligned with Project requirements.

Multi-functional devices (MFDs) will be used and the service contract and will ensure not only that service/maintenance is met but will also be linked with the provider to ensure consumables are supplied.

10. Site investigation works

The MetCONNX approach to the early site investigation works is to aid informing the design during the design development stage, thus providing an efficient outcome as well as helping to achieve the Project time constraints. The key activities to be completed during the early site investigation works can be broken down as follows:

- Geotechnical Investigation Works
- Utility Location and Identification Works
- Feature Survey Works
- Dilapidation Survey Works.

10.1 Geotechnical Investigation Works

The Project Geotechnical Investigation Works requirements can be found within the Design Report (Appendix K: Geotechnical Memorandum).

The general methodology for the Geotechnical Investigation Works will involve:

- Temporary work site delineation - setting up the appropriate fencing requirements for safety and security purposes
- Investigation works inside the rail corridor - works will be carried out under PTA's Working in and around the PTA Rail Reserve Rules 8103-400-004, under the clear guidance of a Rail Protection Officer.
- Investigation works adjacent to/within the road reserve - works will be carried out under the relevant authorities' Road Occupancy Licence requirements and in line with an approved Traffic Management Contractor and their Temporary Traffic Plans.
- Prior to breaking ground, the Geotechnical Investigation contractor will be issued with a Permit to Excavate
- Once all investigation works are completed, the area will be permanently reinstated, and the temporary work site delineation removed.

10.2 Utility identification works

The early utility location and identification works are key to the early identification of any potential clashes that may exist between the utilities and the proposed permanent works.

The accurate recording of identified utilities is also a key piece of information that will be relied upon as part of developing and issuing Permits to Excavate for future works. All recorded information will be fed back into the design model. Existing service provider utilities that interface with the project works are shown in Appendix F.

The general methodology for the utility location and identification works will involve:

- The utility location and identification works will follow the same process as the geotechnical investigation works. However, when carrying out the utility identification works, the excavation will be completed using the process of non-destructive vacuum excavation.
- Where necessary, the key utility providers will be notified of the Project's timeframes and methods of excavation to ensure they have suitable representation on-site to monitor the works and ensure adherence of their requirements.

10.3 Feature survey works

The early feature survey works are critical for informing design. All recorded data will be fed back into the design model to ensure the design is accurately developed to reflect the latest site conditions.

The general methodology for the Feature Survey Works will involve:

- Temporary work site delineation - due to the dynamic nature of the works the temporary works delineation will be simple enough to be moved around with minimal effort.
- Where the works are carried out within the public domain (i.e. public footpath, shared paths and station precincts, etc.), the survey team will be accompanied by traffic/pedestrian managers to ensure the safety of the public while interfacing with the work site.
- Where the works are carried out within the road reserve, and/or on a live carriageway, they will be completed under the relevant authorities' Road Occupancy Licence requirements and in line with an approved Traffic Management Contractor and their Temporary Traffic Plans.
- Survey works inside the rail corridor - works will be carried out under PTA's Working in and Around the PTA Rail Reserve Rules 8103-400-004, under the clear guidance of a Rail Protection Officer.
- Survey works within the rail danger zone will need to be completed under a series of dusk till dawn possessions.
- Survey works within existing drainage/conduit pits will not require any persons to enter the pit, mitigating the need to enter any confined spaces.

11. Armadale viaduct structure works

The MetCONNX Armadale viaduct structure is a flexible solution that is made up of a standardised set of precast elements, as seen in Figure below. An animation of the DfMA components can be viewed from this QR code.

The solution was developed in line with Laing O'Rourke's innovative Design for Manufacture and Assembly (DfMA) 70:60:30 methodology, which strives to undertake 70% of construction off-site, in order to achieve a 60% improvement in productivity and a 30% improvement in the delivery schedule.

Through early engagement between the design and construction teams, MetCONNX have managed to achieve a solution with 85-90% precast concrete elements, thus providing certainty around program deliverables.

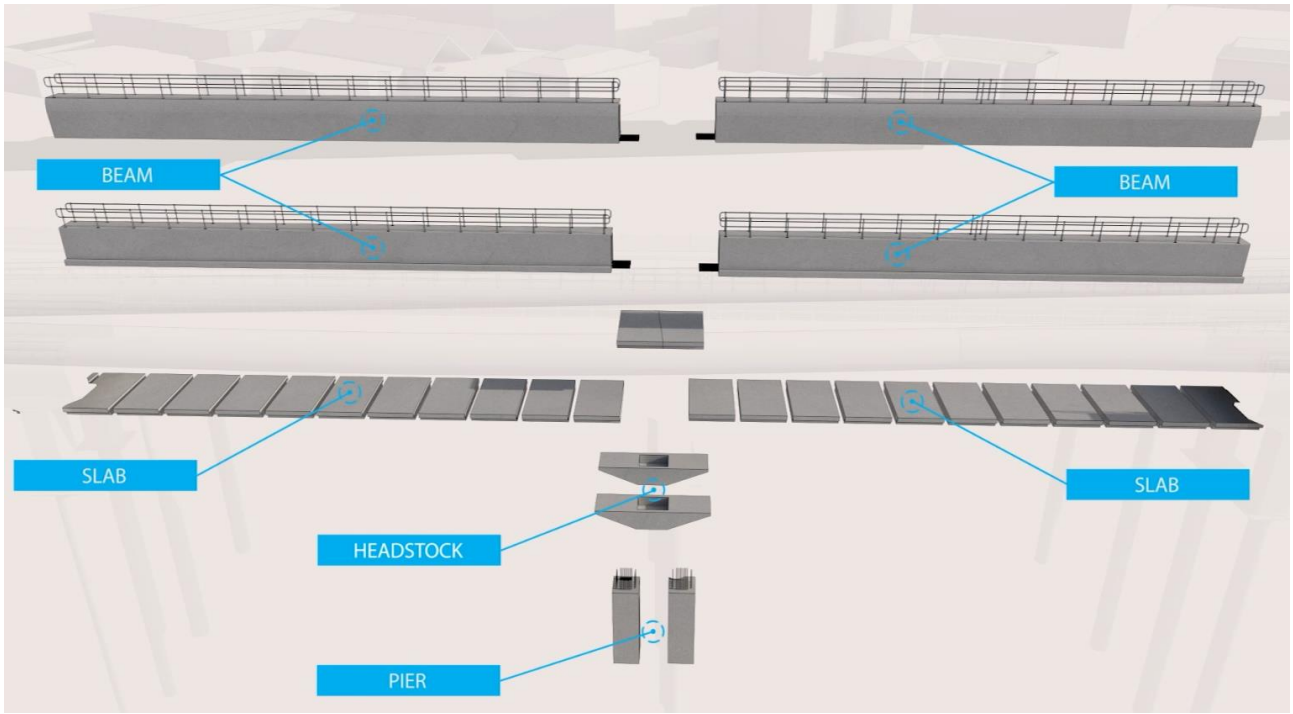


Figure 8: Modular Viaduct Structure 'Kit of Parts' Standardised Elements

The MetCONNX solution has been developed with the following benefits to construction and program certainty:

- Monopile to precast pier connection - mitigating the need to construct pile caps with a cover depth of 2500mm and removing the need for significant in-ground temporary works as well as being reliant on Third Party Utility providers to relocate their existing assets.
- Modular U solution that can be constructed independently - this allows piers, headstocks and beams to be installed without being reliant on the precast deck slab, or opposing structural element, to give it stability. This will allow total flexibility around construction, maximising on the amount of critical path viaduct works that can be completed prior to the rail shutdown and providing program certainty to completion dates.
- No external concrete stitch connection - all elements exposed to the public eye are precast concrete elements. Not only does this ensure a consistent finish but it also removes the need to install temporary false work and formwork, as well as minimising working from heights.

- Minimal temporary propping required when placing the differing precast elements - again, providing certainty around program and installation productivities
- Standardised precast elements allow flexibility as to the location of install (i.e. if the installation crew happens upon a defective element, it can be swapped out promptly without having to wait for it to be precast again)
- Modular U solution that can accommodate all track infrastructure - deck slab span can be increased to allow for twin tracks and track turnouts, as per Figure 9 below.

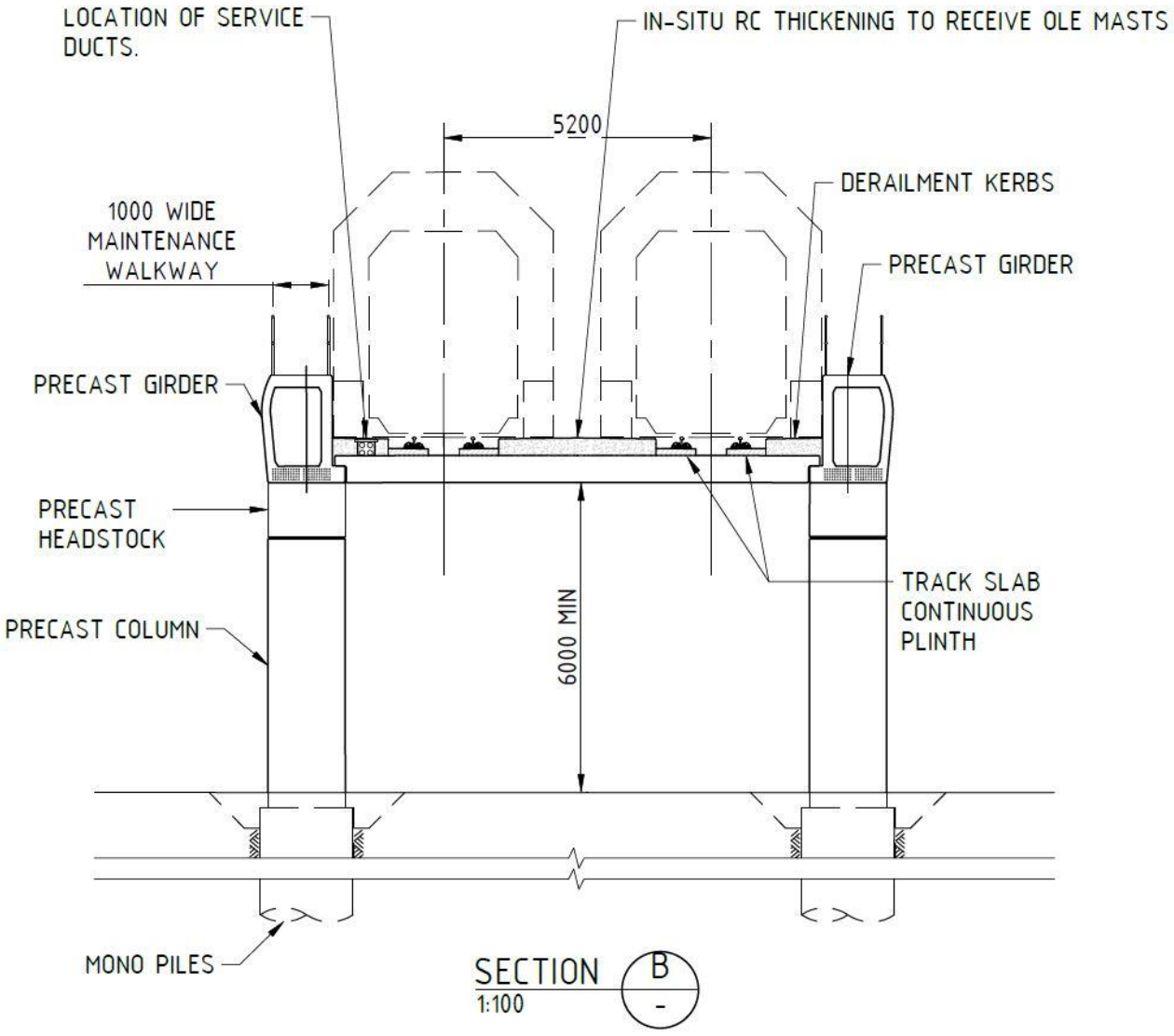


Figure 9: Elevated Cross Section of Modular Viaduct Structure with Two Tracks

- Modular U solution that can accommodate future expansion - where necessary, the design of the precast beams has the flexibility to allow for an additional deck slab to be placed on the opposite flange, therefore mitigating the need for demolition as/when the need arises for the future Bunbury Express expansion. The external beam is shown in Figure below.
- Rail derailment kerb can accommodate Main Cable Route (MCR) conduits - reducing the need to construct and install a separate cable containment route
- Derailment kerb will act as the permanent formwork for the track slab construction - helping to minimise construction durations.

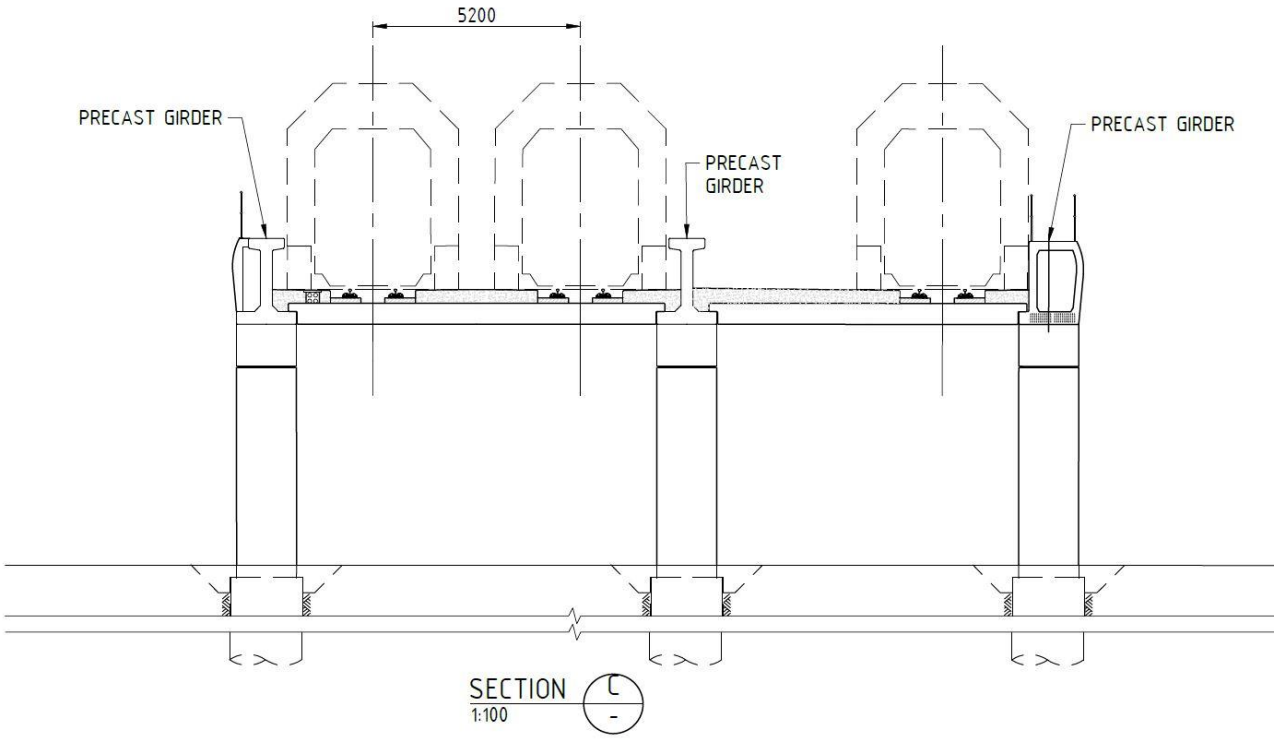


Figure 10: Elevated Cross Section of Modular Viaduct Structure with external girder that can accommodate future expansion

11.1 Non-possession works

The construction methodology for Armadale viaduct and station platform is based on a non-possession works to the western elevation of the viaduct and possession works for the remainder of the viaduct starting Nov 23. This description should be read in conjunction with the staging diagrams provided in Appendix D: Staging diagrams.

To help achieve the critical dates, MetCONNX plans to complete as much work as possible prior to the commencement of the rail possession. This approach helps to minimise the program risk by minimising the quantum of work required during the possession.

Non-possession works will be carried out while the existing Armadale Station is fully operational, along with a fully operational Australind line. All works will be carried out under the PTA's Working in and Around the PTA Rail Reserve Rules 8103-400-004.

To safely manage piling, cranes and lifting within the PTA corridor during the non-possession works there will be several strict controls in place as follows:

- Site inspection with PTA, Asset Owners, Operator and MetCONNX to discuss methodology
- Methodology approved by the PTA before any work commences
- Plant and equipment inspected prior to site mobilisation
- Trained and competent personal – all to have experience working adjacent to live rail
- Engineered/certified crane and piling platform or any ground where plant will traverse
- Structural review of any structures under the piling platform (i.e. services culverts etc.)
- Physical barrier to be installed along the 3m zone with shade cloth
- PRES/spotter to be present for all work where there is a OHW within the radius of the plant

- Safe Work Method Statement
- A dedicated Protection Officer will be present at each work location.

Additionally, specific controls will be in place for the individual operations, and these are described as follows:

1. Piling rig controls:
   (a) The piling rig will be positioned behind timbers that will be located so that the centre of the auger is aligned with the centre of pile thus positioning the rig sufficiently far from the OHW and boundary not to encroach
   (b) At no point will the rig move past the timber
   (c) In addition to the barrier with shade cloth, a rubber curtain attached to the rig will be used to control loose material while extracting the auger
   (d) A Person Responsible for Electrical Safety (PRES) will be involved in planning, present for all works and there to complete all documentation required by the PTA.
   (e) The PRES will have the authority to halt works at any time
   (f) The PRES will ensure that the rig does not track forward from piling position
   (g) The Plant Operator will be notified of any approaching rail traffic by the Protection Officer
   (h) The Plant Operator will hold training in safe electrical approach for cranes and plant, valid within 12 months
   (i) Daily/new set up check sheets as per Figure 11.

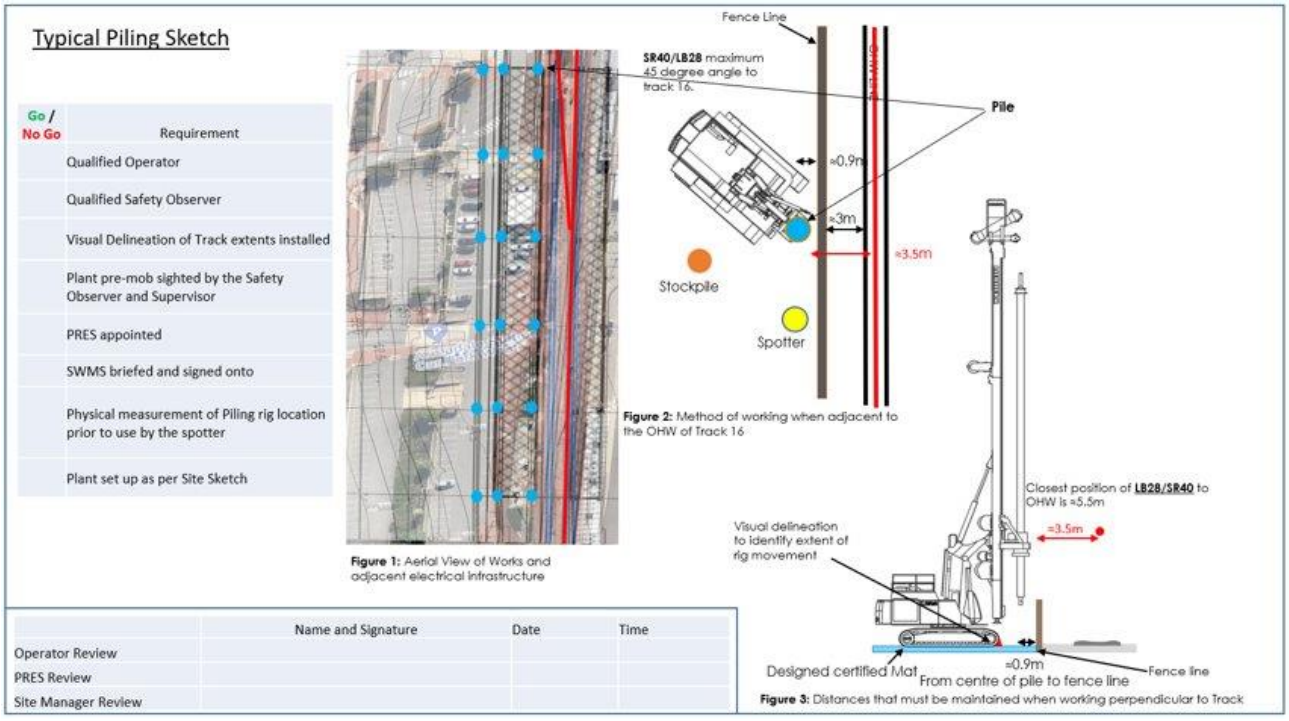


Figure 11: Example of Piling Daily check sheet to be completed prior to commencement of works

2. Crane controls:

(a) Crane Safe inspections and plant pre-mobilisation inspection will be completed prior to commencing works

(b) A Person Responsible for Electrical Safety (PRES) will be involved in planning, present for all works and there to complete all documentation required by the PTA

(c) Before commencing lifting operations, the PRES and Plant Operator will ensure that the planned configuration will not encroach on Safe Approach Distances (SADs) by physically measuring radius on-site

(d) Crane must not track once lifting operations have commenced

(e) Tag line to be used when lifting load into position

(f) The crane operator will be notified of any approaching rail traffic by the Protection Officer

(g) The Plant Operator will hold training in safe electrical approach for cranes and plant, valid within 12 months

(h) A Virtual wall will be used and locked off before lift commences. This includes for Edge Limitation, Localised Sector Limitation, Radius Limitation and Swing Limitation

(i) Daily/new set up check sheets to be completed before work commences as per Figure .

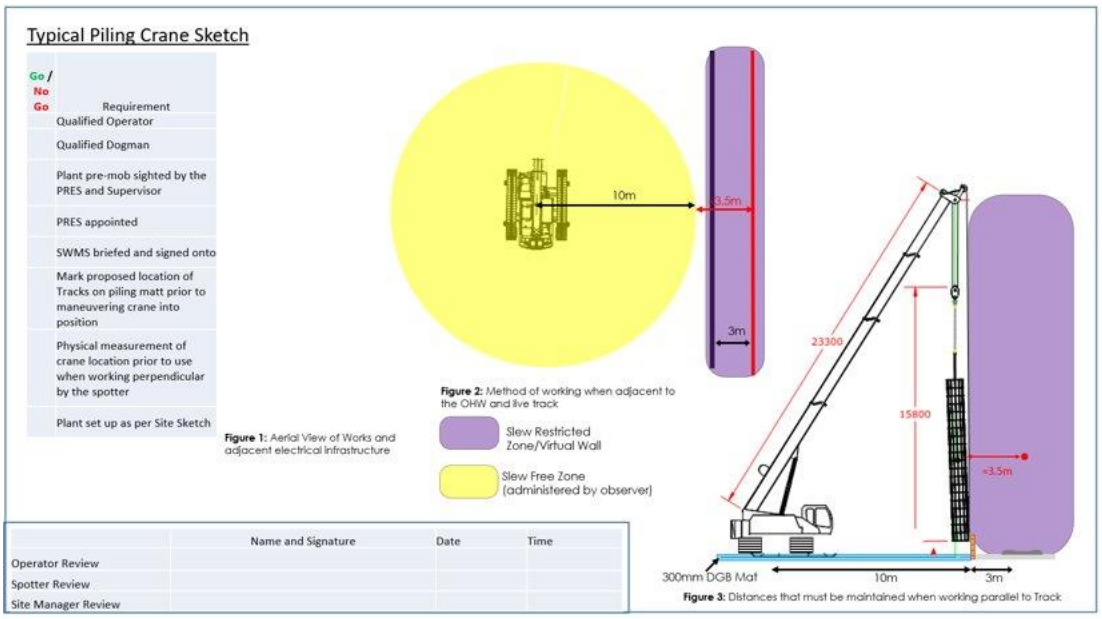


Figure 12: Example of Crane Daily check sheet to be completed prior to commencement of works

3. Excavator controls:

(a) During the construction of the viaduct enabling works there is no need for the excavator to encroach SADs

(b) A Person Responsible for Electrical Safety (PRES) will be involved in planning, present for all works and there to complete the documentation required by PTA

(c) Before commencing using the excavator, the PRES and Plant Operator will ensure that the planned configuration will not encroach on SADs by physically measuring radius on site and enabling slew restrictors

(d) The position and reach of the excavator will be constantly monitored by the PRES

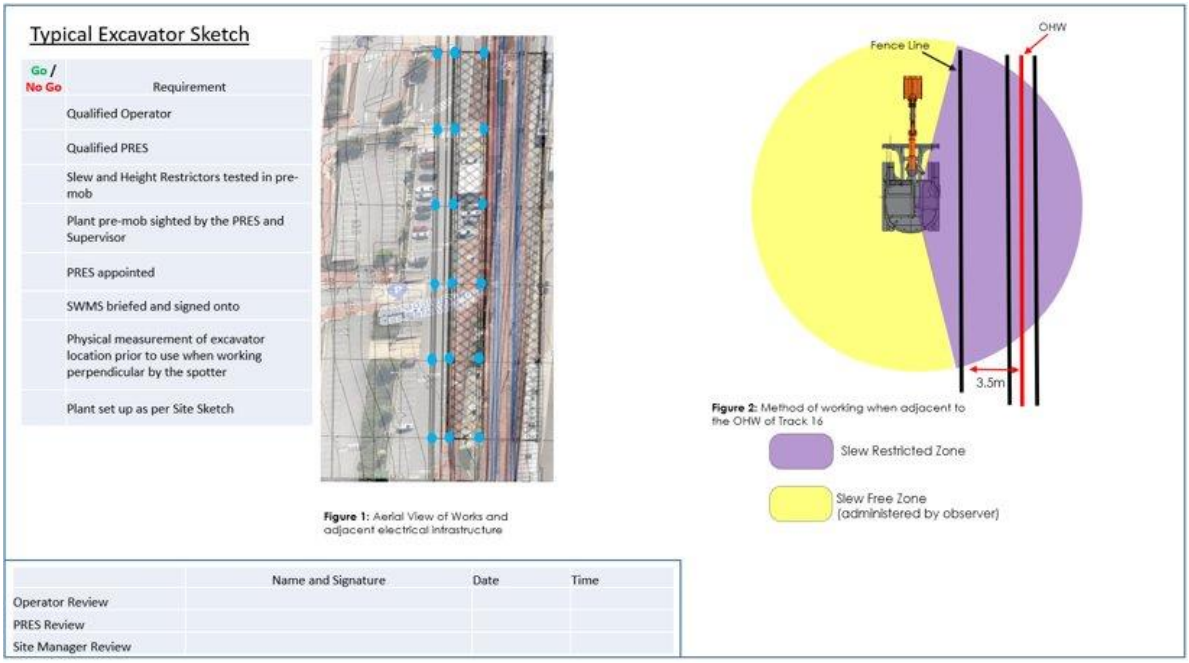
(e) The PRES will have the authority to halt works at any time

(f) The excavator will be notified of any approaching rail traffic by the Protection Officer and will not slew its arm during the approach of the train

(g) The Plant Operator will hold training in safe electrical approach for cranes and plant, valid within 12 months

(h) Once the excavator is in position and moves its arm, it will not be allowed to track

(i) Daily/new set up check sheets to be completed before work commences as per Figure.



Typical Excavator Sketch

Go / No Go	Requirement
	Qualified Operator
	Qualified PRES
	Slew and Height Restrictors tested in pre-mob
	Plant pre-mob sighted by the PRES and Supervisor
	PRES appointed
	SWMS briefed and signed onto
	Physical measurement of excavator location prior to use when working perpendicular by the spotter
	Plant set up as per Site Sketch

Figure 1: Aerial View of Works and adjacent electrical infrastructure

	Name and Signature	Date	Time
Operator Review			
PRES Review			
Site Manager Review			

Figure 13: Example of Excavator Daily check sheet to be completed prior to commencement of works

11.1.1 Viaduct enabling works

The enabling works will consist of the following activities:

- Construction of a new temporary car park and bus interchange on the east side of Armadale Station
- Demolition of the current Armadale Station & Car park
- Work site set up including all temporary fencing requirements
- Site haul road construction
- Piling platform construction
- Viaduct crawler crane platform construction.

The early site investigation works will ensure that all utilities will have been identified and rerouted prior to any viaduct works taking place.

The general methodology for the Viaduct Enabling Works will involve the following:

- Physical barriers will be set in place to demarcate the 3m danger zone - the hard barriers will consist of water filled barriers and gawk screens
- The remainder of the work site will utilise both the existing PTA rail corridor fencing and additional temporary ATF fencing to create a safe and secure area
- Temporary access gates will be established

- Modifications to existing kerb lines carried out to create a new driveway access for construction vehicles
- Construction of haul roads, piling platforms and crane platforms will be completed - following on from the clear and grub exercise
- Haul roads, piling platforms and crane platforms shall be constructed from crushed limestone as per the temporary work design requirements
- Earthmoving machinery will be utilised to box out, where required, for the haul roads and works platforms
- Geofabric will be laid out along the proposed roads and work platforms prior to the delivery and placement of crushed limestone
- Crushed limestone will be delivered and placed at the work face via a Truck and Dog
- The earthmoving machinery will spread and trim the crushed limestone prior to compaction via a heavy impact roller
- The crushed limestone will be re-used for permanent footpath and PSP construction, dependent on timings and suitability.

11.1.2 Piling installation works

The viaduct is supported on a series of 1800mm diameter bored piles approximately 20m deep. Early indication suggests that ground water levels to be at depth and so would not have an impact on the piling operation.

The proposed piling approach, until further and more detailed geotechnical investigation works is completed, would be to construct the pile via the dry open hole method.

If ground water is an issue, the intent would be to partially support the top section of the hole using a temporary steel casing with the addition of water and polymer mixture to support the lower section.

The general methodology for the Piling Works will involve the following:

- Piling rig will auger down to depth, while working from the engineered temporary piling platform formation
- Excavated material generated from the piling operation will be side cast and stockpiled using an excavator
- Once the pile depth has been achieved, and signed off by the geotechnical engineer, the feed crane will place the prefabricated pile reinforcement cage directly into the augured hole
- The correct roller spacers will be fixed to the pile cage prior to lowering into the augured hole - this will ensure that the pile cage sits centre of the hole, and the correct concrete cover is achieved
- Once the pile cage has been installed, and is in its correct location, the concrete is placed using a concrete boom pump
- Concrete trucks will arrive to site and offload the concrete into the concrete boom pumps hopper - all the correct QA checks and tests will be carried out for all concrete deliveries
- The concrete will be placed into the augured hole to the correct pile cut off level
- Once concrete has been placed to the correct level the column connection starter bars will be cast into the top of the pile while the concrete is still wet, as per Figure .

Figure 14: Example of Viaduct Column Starter Bars Set into Top of Pile Concrete Using a Steel Jig

- The Project will utilise a prefabricated steel jig to ensure the correct orientation and location of the column starters
- The jig will be set up by the surveyor prior to the connection starter bars being installed - the steel jig will sit on a level pad to ensure correct verticality of the starter bars.

11.1.3 Precast column and headstock installation

The precast column and headstock are structurally connected back down through to the cast in-situ pile to provide continuity.

The precast column is structurally connected to the pile via starter bars and high strength grouting.

The headstock is structurally connected to the precast column via post tensioning of Dywidag anchor bars cast into the precast column.

Sizing and weights of both the precast column and headstock allows the elements to be delivered with no restrictions. This means that MetCONNX have flexibility and certainty around precast supply, especially as the precast manufacturing/storage yard is a little under 15km from the Armadale location.

The general methodology for the column and headstock works will involve the following:

- Precast columns will be delivered to the work front in a just in time fashion - this will be managed by the MetCONNX Delivery Management System - Voyage Control
- The columns will be lifted directly off the delivery vehicle utilising the 300t crawler crane

- The column will be placed on the ground to allow for re-rigging and up-righting
- Once the column has been up-righted the crawler crane will lift the column into its final location
- The column will be placed over the pile starter bars, slotting into the grout tubes cast into the bottom of the column
- The column will be temporary propped on two sides utilising push pull props to allow the grouting to be completed
- Grout will be injected into the grout tubes - ensuring the grout completely fills the void in the grout tube
- Once the grout has gained strength the headstock will be installed
- The precast headstock unit will be delivered to the work front in a just in time fashion
- The headstock will be lifted directly off the delivery vehicle and placed into its final location
- Temporary edge protection will be installed to the top of the headstock prior to it being lifted into place
- The precast headstock will be threaded through the Dywidag Anchor Bars cast into the precast column and landed on levelling shims
- Once the headstock is in its final location, the Dywidag Anchor Bars will be post tensioned by hand to allow the crane to release the load
- The headstock will then need to be fully post tensioned once the crane has released the load
- The post tensioning works will be completed from an elevated work platform with the stressing equipment located on top of the headstock
- Stressing equipment will consist of the following:
  - Steel Trestle
  - 900t centre hole jack
  - Gantry crane for lifting purposes as per Figure.

Figure 15: Example of typical lifting gantry to be used during post tensioning works on the headstock

- Detailed post tensioning procedure is as follows, and as per Figure :
  - Install coupler onto protruding end of bar and screw in pull rod ensuring coupler is correctly engaged
  - Install stressing trestle over pull rod and ensure bearing evenly on bearing plate
  - Install 90T hydraulic centre hole jack over pull bar and onto jacking trestle ensuring it is centrally located and run ram out 10mm
  - Install top bearing plate over tie bar and install and hand tighten the rear nut
  - Slowly apply load to tie bar using hydraulic pump and monitor pressure on gauge until starting or datum load is reached
  - Measure length of end of tie bar from face of bearing plate and record load and datum measurement on record sheet.
  - Once the headstock has been post tensioned to the correct design stresses, a joint bead is installed between the headstock and the column - prior to placement of grout to fill the void and to grout in the plates and nuts.

Figure 16: Example of post tension jacking

11.1.4 Precast viaduct beam and slab installation

The viaduct beams sit directly on to a 50mm elastomeric bearing pad on top of the precast headstocks.

The main viaduct beams do not require additional temporary propping when being placed - this helps to provide program certainty around installation productivities.

The main viaduct beams do not require additional temporary propping to allow the deck slabs to be placed into place - this helps to provide program certainty around installation productivities.

Sizing and weights of the precast slabs allow the elements to be delivered with no restrictions.

Sizing and weights of the precast beam means we have restrictions around delivery during school drop-off (am) and school pick-up (pm).

The general methodology for the Viaduct Beam and Deck Slab Works will involve the following:

- The beams will be delivered to site via a prime mover and jinker unit - they will arrive in a just in time fashion to remove the need for double handling requirements
- The beam install lift sequence is detailed in Figure below, and as per the following points:
- The delivery vehicle will arrive and locate itself in the correct lifting location
- Once the 300t crawler crane takes the beam load, the delivery vehicle will move out of the way - with the prime mover travelling in a forward direction and the jinker unit moving in a reverse direction, this is to ensure the vehicle isn't unnecessarily travelling under a suspended load
- The crawler crane will lift and place the beam into its final location - with the beam being placed directly onto 50mm elastomeric bearing pads on top of each precast headstock

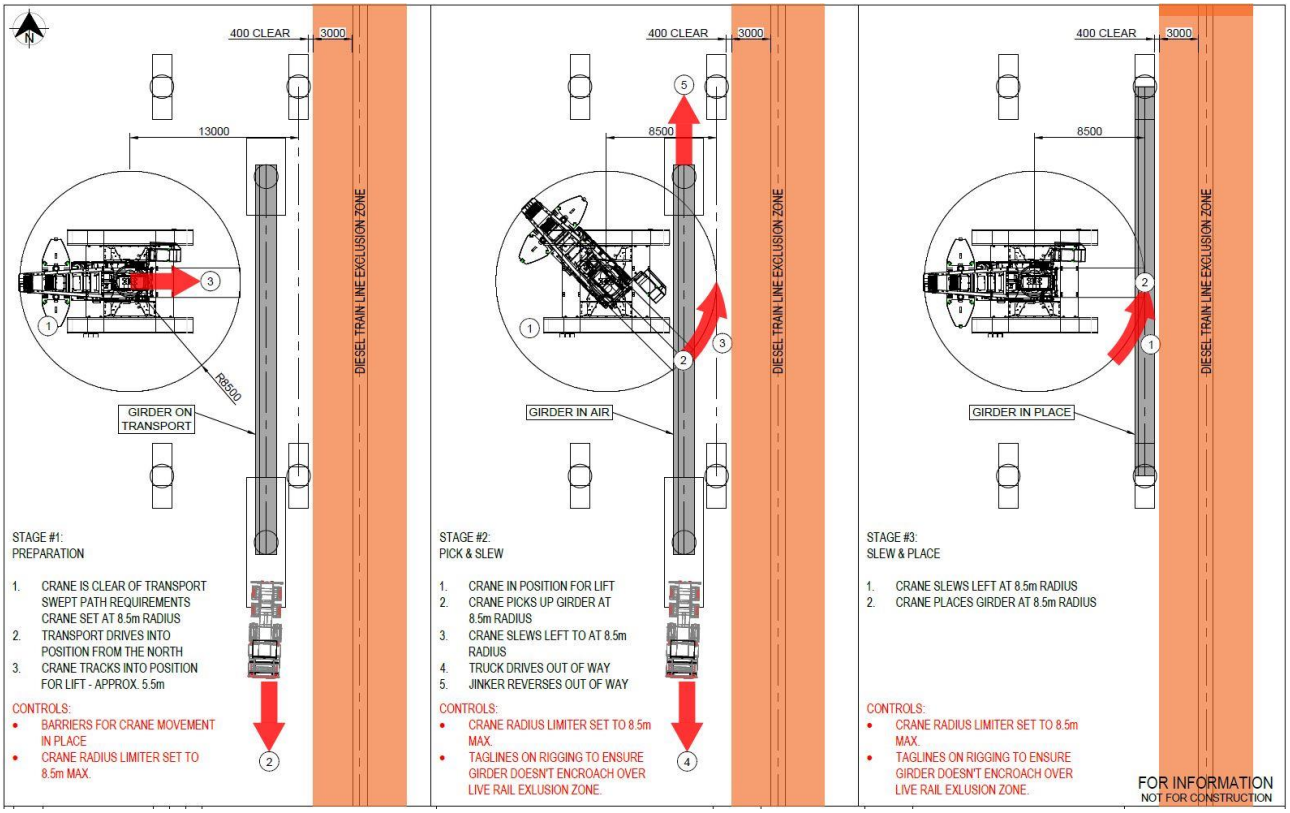


Figure 17: Proposed staging for delivery and lifting of precast viaduct beams

- Once a pair of opposite beams are in place, the precast deck slab units can start to be installed
- The deck slab units will be delivered directly to the installation location
- A smaller 170t mobile crane will be used for the installation of the deck slab units
- The crane will be set up at a location to allow them to place all the units for the full span of the viaduct beam
- The deck slabs will be lifted directly off the back of the delivery vehicle and placed into its final location - seated in between the beams directly on top of the bottom flange of the viaduct beams as per Figure 16 below.

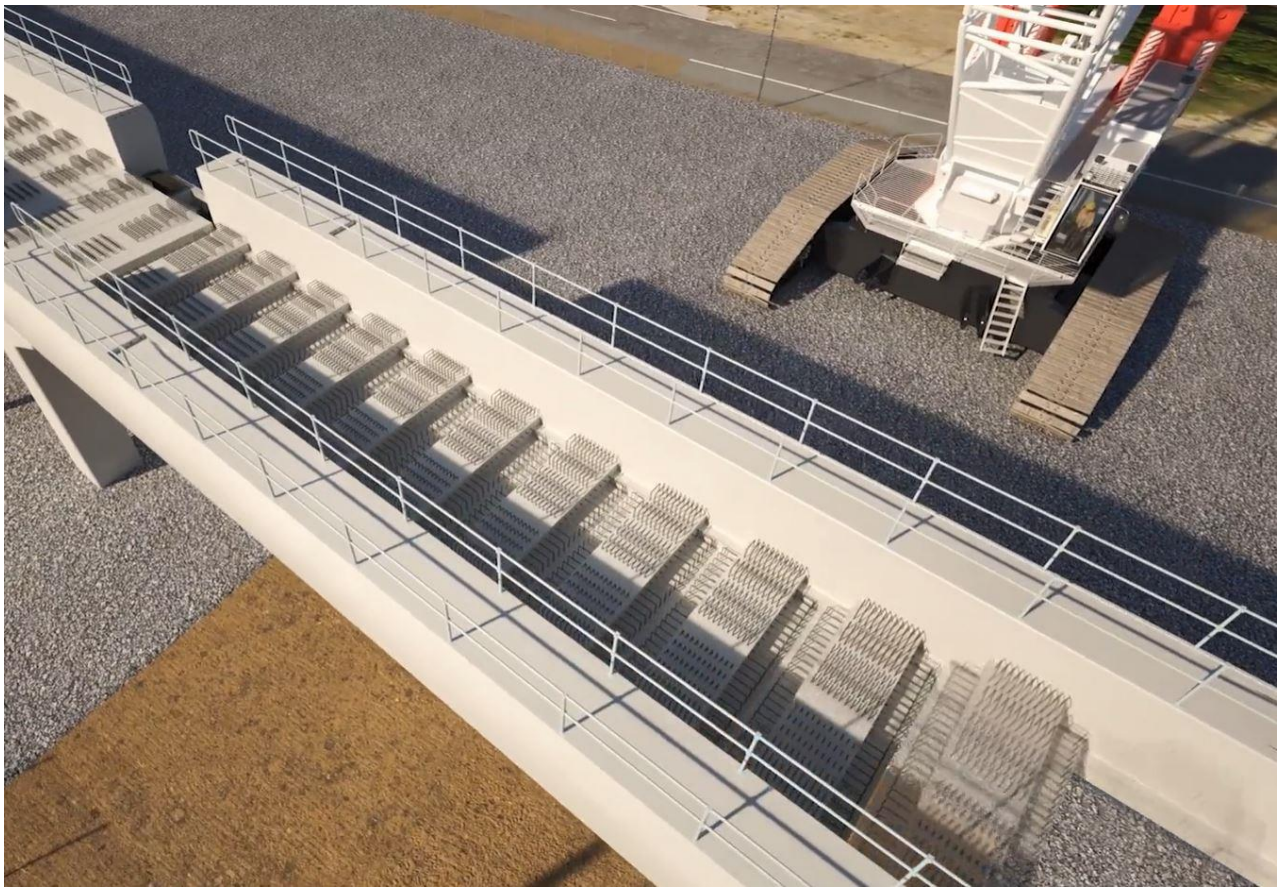


Figure 18: Bridge deck slabs being placed between the viaduct bridge beams

- A mobile elevated work platform will be used by the crane crew to unhook the rigging equipment from the deck slab units.

11.1.5 Reinforced concrete headstock stitch connection construction

Viaduct beam structural continuity is achieved through the introduction of the headstock in situ concrete stitch connection.

The stitch pour will utilise traditional formwork system.

The general methodology for the Headstock Stitch Connection Works will involve the following:

- Once the beams have been installed on either side of the headstock, completing a minimum of two spans, the headstock stitch connection works will commence
- To provide edge protection for the in situ concrete works, the external form for the headstock will be installed first. This will be lifted into location and fixed down to the headstock with its permanent propping and fixings, as per Figure 35.

Figure 19: External form to enable the headstock stitch construction

- The prestressed strands from each beam will be arranged to allow the prefabricated reinforcement cage to be lifted into location. The final tying of the reinforcement will be completed in situ and the prestressing strands will be re-arranged to their final location.
- Reinforcement installation is completed.
- The internal formwork will be lifted into location and fixed into place ready for concrete placement
- Concrete will be placed, via a concrete boom pump, to complete the headstock stitch connection.
- The completion of the headstock stitch connection will see the handrails being installed - closing off the void between the handrails already installed on the precast viaduct beams
- The external handrail will be installed via an elevated work platform, once installed the internal handrail will be completed from on top of the beam walkway behind the external handrail

11.1.6 Precast station platform slab installation

The station platform slabs are structurally connected back to the precast beams through a reinforced concrete stitch connection.

The precast platform slabs sit directly on top of the precast beams within the station area.

The station precast beams require horizontal propping between beams prior to the placement and structural connection of the platform slabs.

Sizing and weights of the precast station platform slabs allow the elements to be delivered with no restrictions.

The general methodology for the Platform Slab Installation Works will involve the following:

- Once the station platform beams have been installed and temporary propping between the beams completed, the platform slab install will commence
- The precast platform slabs will be delivered direct from the precast storage to site and lifted from the delivery vehicle directly to its final location
- The platform slabs will be installed using the 170t mobile crane
- The mobile crane will set up at an optimum location to enable multiple platform slabs to be installed without having to continually move the crane and complete multiple set ups
- The platform slabs will be landed directly on top the inverted T-Beams Beams as per Figure 37 below

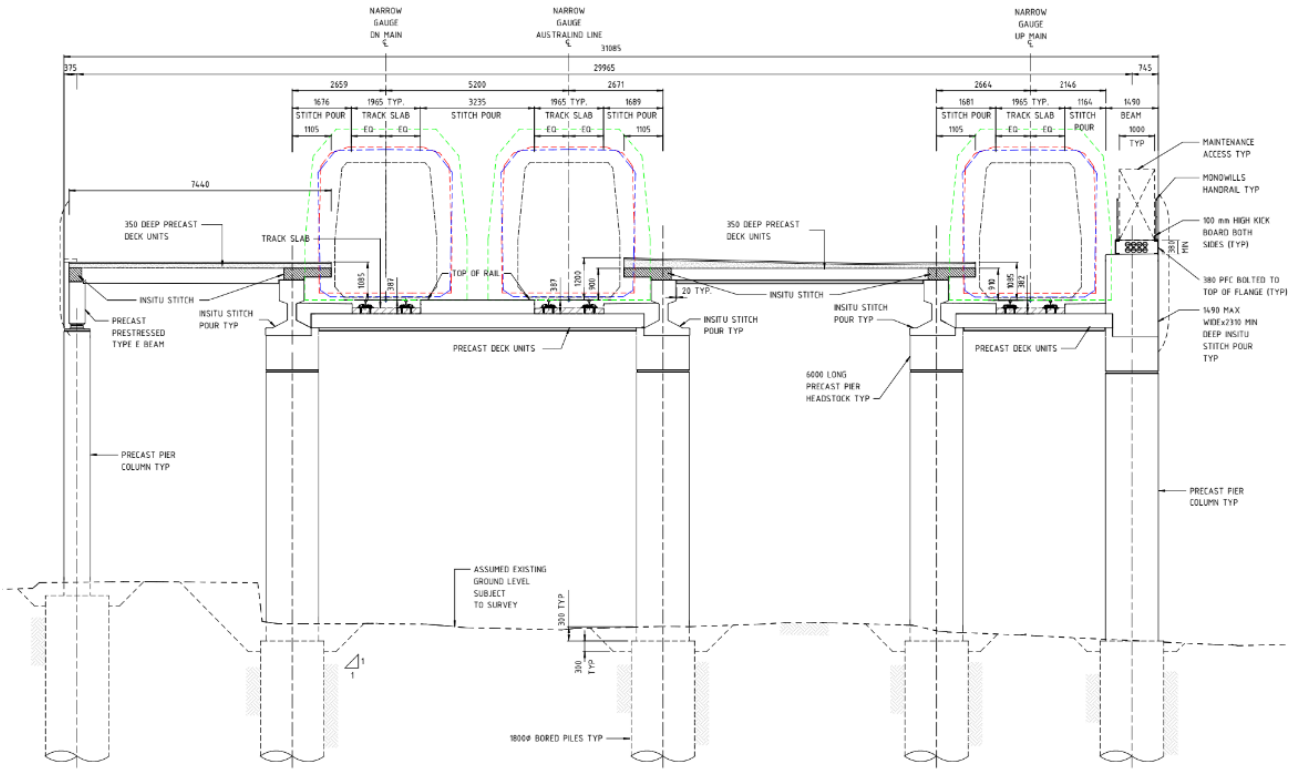


Figure 20: Precast concrete platform slab being placed onto the inverted T bridge beams

- The outer edge of the platform slabs will have edge protection installed prior to lifting into place
- Once the platform slab is located, and secured in its final location, an elevated work platform will be used to remove the crane's rigging
- Sealing of the joint between the beam and the platform slab will be completed - this work will be completed from an elevated work platform
- Once the sealing and edge forms for the beam and slab connection has been completed, the in situ stitch connection can commence
- The concrete in situ connection between the beam and slab will be placed using the concrete boom pump
- The temporary propping between the beams is then removed once the concrete stitch has achieved design strength.

11.1.7 Reinforced concrete train derailment kerb construction

The reinforced concrete train derailment kerb provides continuity by structurally connecting the Viaduct Beams back into the Viaduct Deck Slabs.

The reinforced concrete train derailment kerb provides continuity along the viaduct by structurally connecting the Viaduct Deck Slabs.

The train derailment kerb accommodates the Main Cable Route along the length of the viaduct by housing it in an encased bank of conduits.

The general methodology for the Reinforced Concrete Derailment Kerb Works will involve the following:

- The train derailment kerb construction can commence once the headstock stitch connection has been completed

The reinforcement for the derailment kerb will be tied back to the precast bridge beam starter bars and precast bridge deck slab units starter bars

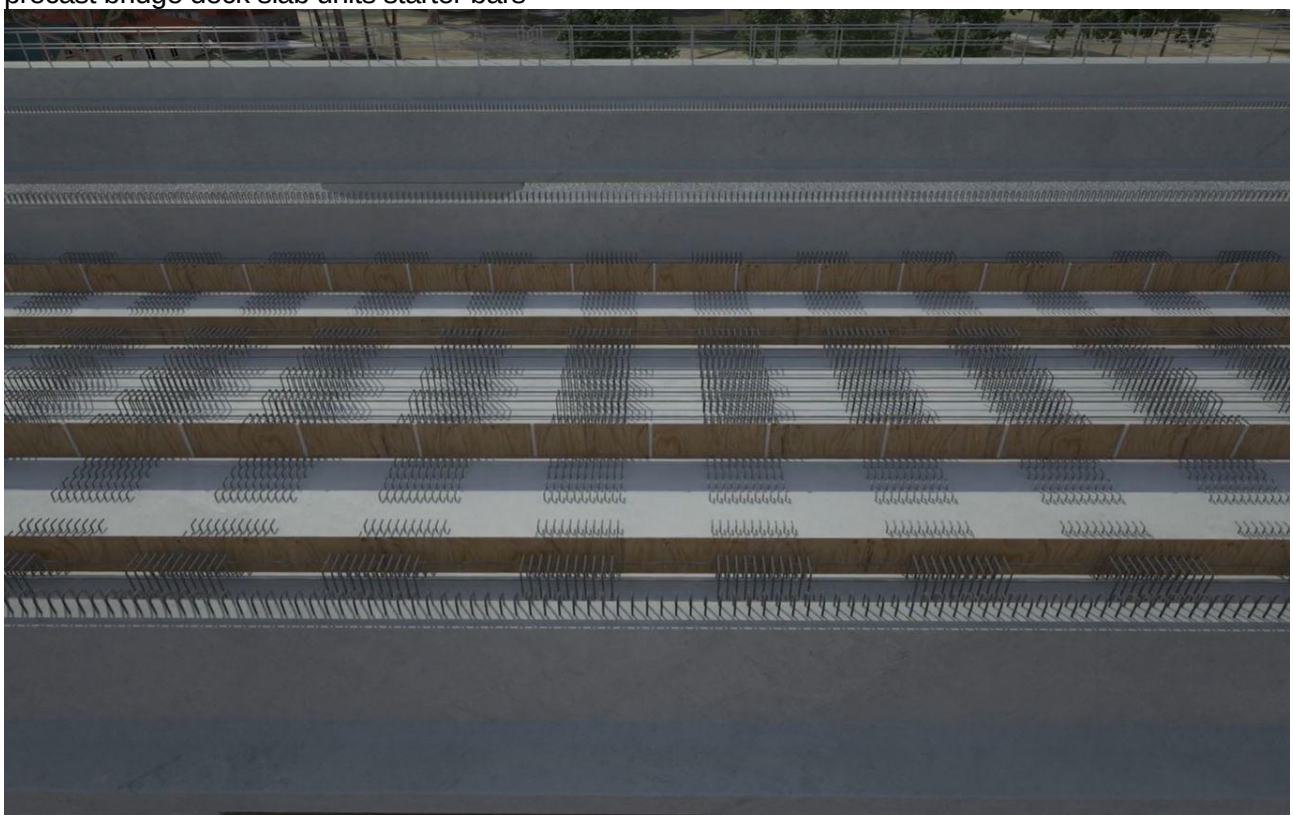


Figure 21: Reinforcement starter bars for the track slab and derailment kerb construction

- The prefabricated reinforcement cage will be lifted into location to allow the final tying of the steel in situ
- Conduits for the main cable route will be in the preformed voids of the reinforcement cage

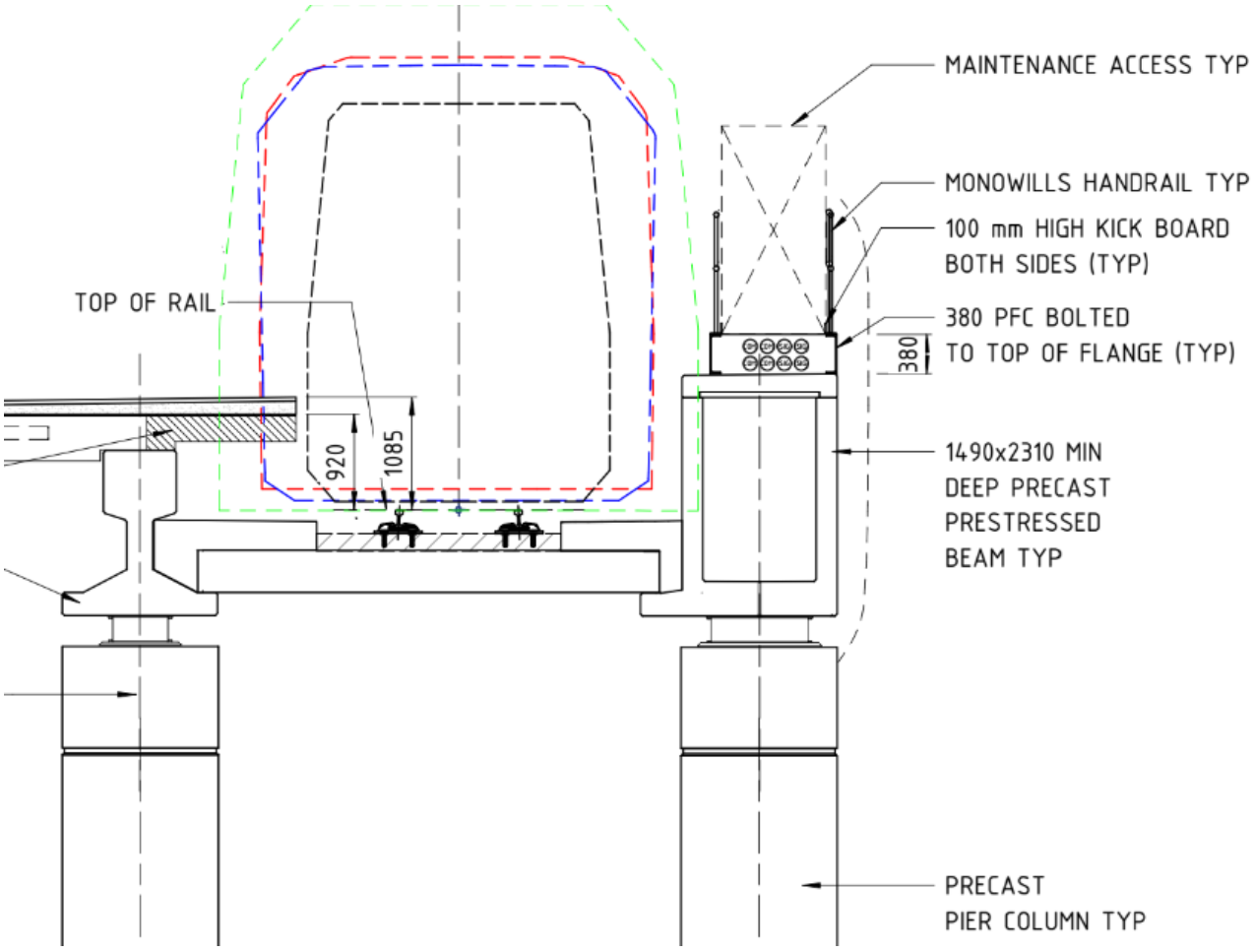


Figure 22: Elevated cross section showing the proposed main cable route located within the derailment kerb

- Once the reinforcement is completed, and the conduits are installed, the edge formwork is erected prior to the placement of concrete
- The concrete for the train derailment kerbs will be placed via the concrete boom pump
- Following the placement and curing of the concrete, the formwork will be stripped and removed to allow the track slab construction to commence
- The train derailment kerb structure will act as permanent formwork for the track slab structure - thus removing the need to install additional formwork, saving on installation time.

11.1.8 Bottom-up track slab pour

Following the longitudinal stitch pours over two spans of the viaduct, the 'bottom up' track slab construction will commence. The stitch pours have been designed to also form the derailment kerbs and permanent shutters for the track slab making the concrete layer of the track slab very simple and quick to place.

This allows the Track team to commence coring works and the follow on track works much quicker than a Top-Down approach.

11.2 Possession Works

The construction methodology for Armadale viaduct and station platform possession works should be read in conjunction with the staging diagrams provided in Appendix D: Staging diagrams.

12. Armadale viaduct approach structures

To provide certainty around achieving the constrained timeframes, MetCONNX proposes utilising the modular viaduct structural solution to extend the viaduct down to ground.

Extending the viaduct an additional 420m on the southern approach and 450m on the northern approach has allowed us to remove the need for two pedestrian bridge crossings at Friar Road and Prout Road.

The construction methodology detailed previously cover the main portion of the Armadale viaduct approach structure works.

The viaduct will transition back to grade at the Viaduct Bank Seat Abutment, as per the Wungong Brook abutment. Further details on the construction methodology in these locations can be found in Appendix D Construction Staging Drawings.

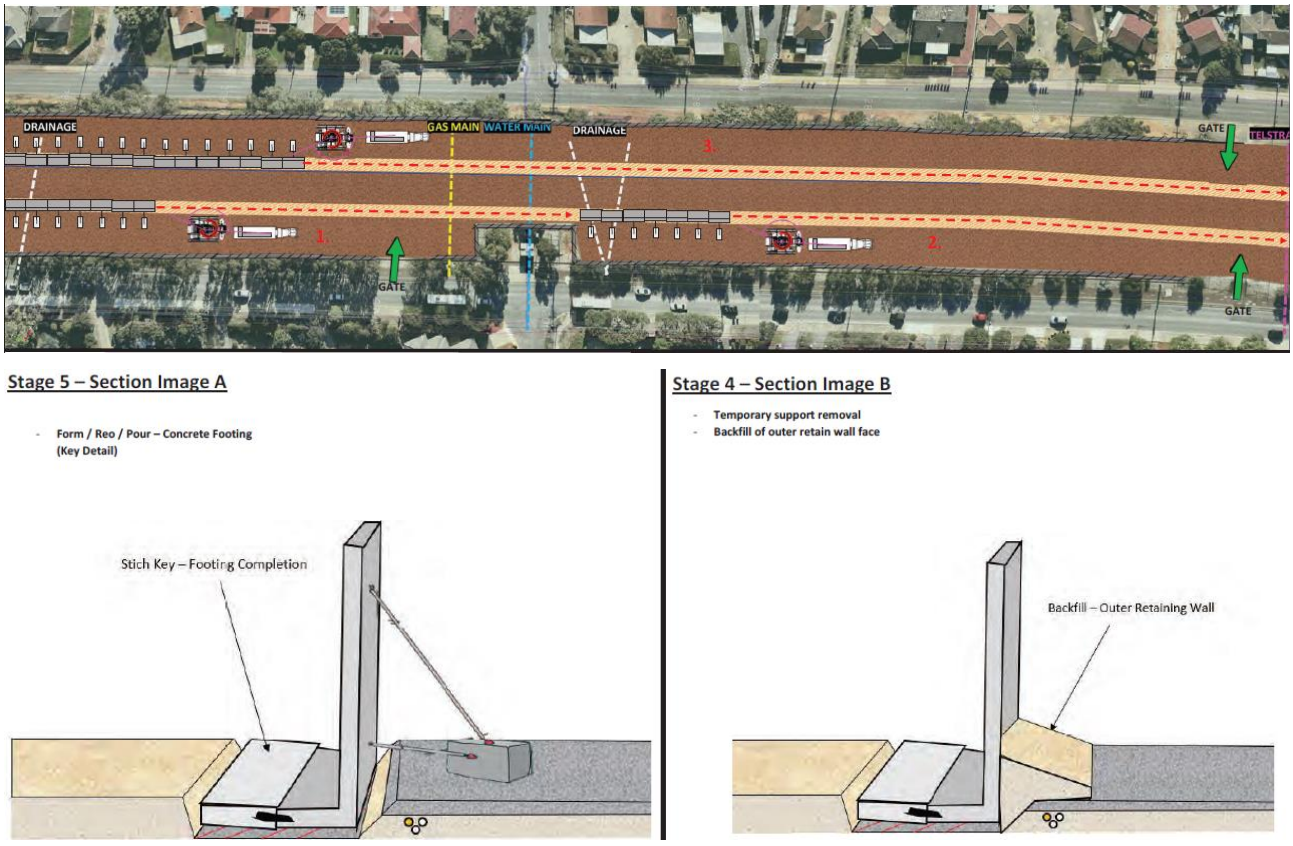


Figure 23: Installation of Precast Earthen Ramp & retaining Walls

12.1 Armadale Viaduct Abutment Construction

The bank seat abutment will consist of the following elements:

- In situ concrete bored piles
- In situ concrete pile cap and abutment wall
- In situ concrete approach slab
- In situ concrete deflection wall

12.1.1 Piling Installation Works

The viaduct enabling works will be completed as per previous section prior to the commencement of abutment pile installation.

The general methodology for the pile installation works will follow that clearly prescribed in piling section of this document. However, there is no need to plunge in the pile reinforcement starter bars, as per the main viaduct piling solution, after the pile concrete has been placed. The following general methodology will follow once the pile concrete has been placed:

- Pile concrete is placed to a level that extends past the pile cut off level, with the pile reinforcement starters extending past the pile cut off.
- Pile concrete is then broken back to pile cut off level.

12.1.2 Pile Cap and Abutment Wall Installation Works

The pile cap structure will incorporate the abutment wing wall as seen in Figure below:

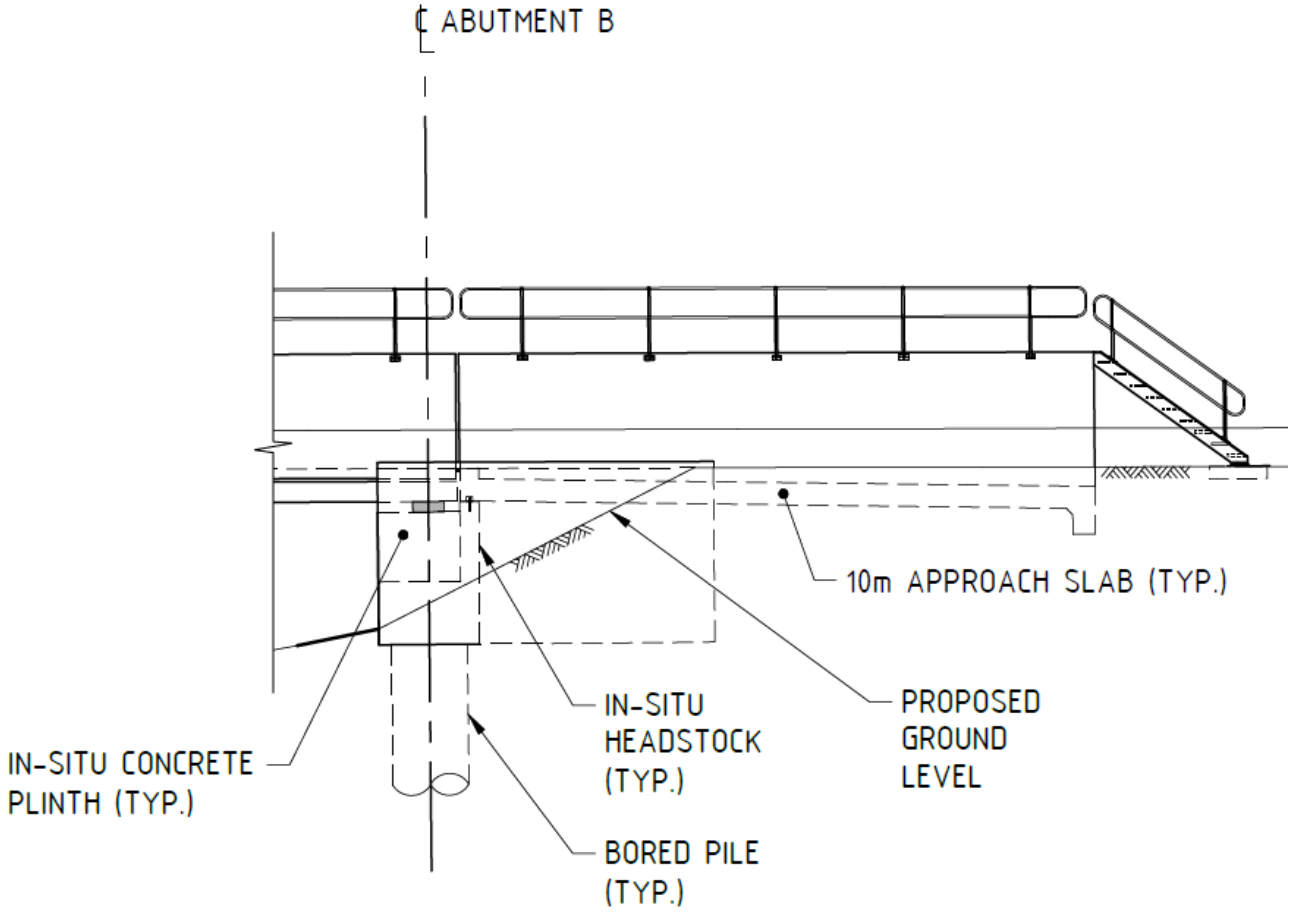


Figure 24: Cross section detail of the viaduct abutment

The general methodology for the Pile Cap and Abutment Wall Installation Works will involve the following:

- Following pile installation there is a requirement to prepare the area around the piles
- The ground around the piles will be trimmed down to formation using a small excavator

- A blinding layer will be placed to allow for the placement of capping beam reinforcement and capping beam formwork
- The prefabricated reinforcement pile capping cage will be placed and tied back into the pile starters
- Following on from the pile cap reinforcement completion, the formwork is installed in preparation for concrete placement
- The pile cap concrete will be placed with a kicker installed for the wing wall construction
- The pile cap concrete will be placed utilising the concrete boom pump
- Following pile cap completion and stripping of the formwork, the wing wall reinforcement is completed with formwork installed ready for placing concrete
- The wing wall concrete will be placed utilising the concrete boom pump
- The formwork will be removed once the concrete has achieved design strength
- An excavator and dynamic compaction roller will be utilised to backfill against the abutment wall, bringing the ground level back to formation in preparation for the track approach slab construction.

12.1.3 Reinforced concrete approach slab and deflection wall installation works

The concrete approach slab is a simple reinforced concrete slab on grade.

The general methodology for the Reinforced Concrete Approach Slab Installation Works will involve the following:

- The approach slab area is trimmed to formation using a small excavator. The small amount of spoil arisings generated will be cast and spread to the side
- A concrete blinding layer is placed to the correct grade - in preparation for reinforcement
- The prefabricated reinforcement sections will be placed into their final location - the sections are then tied together
- The deflection wall reinforcement starters will then be fixed into place along the edge of the proposed approach slab structure
- The formwork edge shutters are then placed and fixed into location - these are only minor forms due to the thickness of the slab. This will include a small kicker to allow the formwork for the deflection wall to be completed at the second stage of concrete placement.
- Concrete is then placed for the approach slab and deflection wall kicker using a concrete boom pump - the concrete will be float finished to the correct levels
- The concrete will then need to be cured in line with the design requirements prior to removing the formwork and finalising the localised earthworks
- Once the minor localised earthworks have been completed, the prefabricated reinforcement cages for the deflection walls will be installed
- This will be followed by the installation of the internal and external formwork and then the placement of the concrete
- Once the deflection wall formwork is removed it will allow the installation of the deflection wall handrails and access stairs.

13. Armadale station precinct

The construction methodology for the Armadale Station will be covered in a future DA.

Appendix A: Terms and definitions

The following terms, abbreviations and definitions are used in this plan.

Table 2: Terms and definitions

Term	Definition
AS	Australian Standard
AS/NZS	Australian/New Zealand Standard
ASS	Acid Sulphate Soils
BRE	Byford Rail Extension
CAD	computer aided drafting
CEMP	Construction Environmental Management Plan
DE	Digital Engineering
DfMA	Design for Manufacturing and Assembly
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
FOPS	Falling object protection system
FSR	Fatal and severe risk
HAZMAT	hazardous material
HSE	health, safety and environment
Laing O'Rourke	Laing O'Rourke Australia Construction Pty Limited
LGA	Local Government Authority
MFD	Multi-functional devices
MRWA	Main Roads Western Australia
MSE	Mechanically stabilised earth
O&M	operations and management
OH&S	Occupational Health and Safety
Project	METRONET Byford Rail Extension Project
PShP	Principal shared path
PTA	Public Transport Authority
ROPS	Roll over protection system
SWMS	safe work method statement
SWTC	Scope of Works and Technical Criteria
TEC	Threatened Ecological Communities
TWCR	Temporary Works Control Register
WBS	work breakdown structure

Appendix B: Initial plant and equipment register

Large plant

Asset No.	Description	Current Location	Comments
CC009	LR1350-1 - Liebherr 350t Crawler Crane with superlift	Perth	Select
CC010	LR1300 SX - Liebherr 300t Crawler Crane	Perth	Select
CC011	LR1300 SX - Liebherr 300t Crawler Crane	Perth	Select
CC015	CKE2500G-2 - Kobelco 250t Crawler Crane	NSW	Select
MC041	RT880E - Grove 75t Mobile Crane	Perth	Select
MC042	RT765E-2 - Grove 60t Mobile Crane	Perth	Select
MC043	RT765E-2 - Grove 60t Mobile Crane	Perth	Select
CC013	LTR1060 - Liebherr 60t Crawler Crane	Perth	Select
CC014	LTR1060 - Liebherr 60t Crawler Crane	Perth	Select
BOOM036	BOOMLIFT.KNUCKLE.18M. (60FT / Tri-Gauge)	Sydney	Sydney Rail Ops
BOOM037	BOOMLIFT.KNUCKLE.18M (60FT / Tri-Gauge)	Sydney	Sydney Rail Ops
BOOM038	BOOMLIFT.KNUCKLE.18M. (60FT / Tri-Gauge)	Sydney	Sydney Rail Ops
30T EXC 01	30T Non Hi-Rail Excavator in WA	Perth	Select
	LR1300 SX - Liebherr 300t Crawler Crane	Perth	Cross Hire
	LG1750 - Liebherr 750t Mobile Crane	Perth	Cross Hire
	170t Mobile Crane	Perth	Cross Hire
	170t Mobile Crane	Perth	Cross Hire
	170t Mobile Crane	Perth	Cross Hire
	170t Mobile Crane	Perth	Cross Hire
	170t Mobile Crane	Perth	Cross Hire
	100t Mobile Crane	Perth	Cross Hire
	50t Mobile Crane	Perth	Cross Hire
	40t Dumper Trucks	Perth	Cross Hire
	CAT 330Excavators	Perth	Cross Hire
	CAT 320 Excavators	Perth	Cross Hire
	CAT D6 Dozers	Perth	Cross Hire
	CAT 140 Graders	Perth	Cross Hire
	CAT Heavy-Duty Front-End Loaders	Perth	Cross Hire
	18t Sheep's Foot Rollers	Perth	Cross Hire
	19t Smooth Drum Rollers	Perth	Cross Hire
	Telehandlers	Perth	Cross Hire
	Water Carts	Perth	Cross Hire
	Road Sweepers	Perth	Cross Hire
	EWP - Scissor Lifts	Perth	Cross Hire
	EWP - Scissor Lifts	Perth	Cross Hire

Appendix C: Temporary Works Control Register

Activity	Project Zone	Portion	Description of Temporary Works
Site Establishment - Package	Armadale Station	Site Offices	Site Establishment - Crane Platform - Office Crane Lifts
	Armadale Station	Site Offices	Site Establishment - Service Connections
	Armadale Station	Site Offices	Site Establishment - Temporary Fencing (Embedded Fence Post & Ground Review)
	Armadale Station	Site Offices	Site Establishment - Office compound and amenities Hard Stands
	Armadale Station	Site Offices	Site Establishment - Office compound awnings design and sign off
	Armadale Station	Site Offices	Site Establishment - Car park - Site entry gates, traffic management, pavement design and temp roads
Pile / Crane Pads - AREA 2 & 3	Armadale Station	Viaduct	Viaduct Structure - Utility Diversions
	Armadale Station	Viaduct	Viaduct Structure -Piling / Crane Platforms (Stage 1 Platforms AREA 2 & 3)
	Armadale Station	Viaduct	Viaduct Structure - 3rd Party Review Crane Operations Bearing Assessment
	Armadale Station	Viaduct	Service Protection Assessment Piling Platforms (Stage 1 Platforms AREA 2 & 3)
	Armadale Station	Viaduct	Viaduct Structure -Piling / Crane Platforms Expansion (Stage 2 Platforms AREA 2 & 3)
	Armadale Station	Viaduct	Viaduct Structure - Delivery Access Roads - Columns, headstocks and transverse slabs
Test Piles	Armadale Station	Viaduct	Viaduct Structure - Pile Cage - Welding of Cages for Lifting
	Armadale Station	Viaduct	Viaduct Structure - Pile Cage - Cage Support Trapper Bars
	Armadale Station	Viaduct	Viaduct Structure - Pile Cage - Lift Plans / Rigging Plans
	Armadale Station	Viaduct	Viaduct Structure - Pile Hole - Edge Protection / Engineered Lid
Viaduct Precast Installation - Package	Armadale Station	Viaduct	Viaduct Structure - Temp Propping - Columns / Headstocks
	Armadale Station	Viaduct	Viaduct Structure - Temp Supports - Headstocks
	Armadale Station	Viaduct	Viaduct Structure - Temp Supports/Permit to load - Girders Type A/D/E

	Armadale Station	Viaduct	Viaduct Structure - Temp Supports/Permit to load - Girder type D
	Armadale Station	Viaduct	Viaduct Structure - Temp Supports/Permit to load - Girder type E
	Armadale Station	Viaduct	Viaduct Structure - Temp Supports Design 3rd party Review (Global - Crane / Props / Pad)
	Armadale Station	Viaduct	Viaduct Structure - Girder type A outer web temp braces and fixing to headstock for continuity pour
	Armadale Station	Viaduct	Viaduct Structure - Girder type A - restraint of slab precast bolted to girder outer web temp brace
Viaduct Access Scaffolds - To Construction Requirements	Armadale Station	Viaduct	Viaduct Structure - Scaffold - Access to the top of Viaduct (Stretcher Access) (Designed to be liftable)
Viaduct FRP Formwork - Package	Armadale Station	Viaduct	Viaduct Structure - Formwork/Falsework - Girder Stitch Pours
	Armadale Station	Viaduct	Viaduct Structure - Formwork - Slab to Girder Stitch Pours
	Armadale Station	Viaduct	Viaduct Structure - Formwork - Derailment kerbs and OLE foundations
	Armadale Station	Viaduct	Viaduct Structure - Formwork - Deflection wall stiches and infills
	Armadale Station	Viaduct	Viaduct Structure - Falsework - Expansion Joints
	Armadale Station	Viaduct	Viaduct Structure - Crane Platform - Concrete Pump
FRP Access Modifications	Armadale Station	Viaduct	Viaduct Structure - Scaffold - Modifications / Build allowance for FRP subcontractor access.
PTA Bearing Replacement Activity - Package	Armadale Station	Viaduct	Viaduct Structure - Scaffold - Bearing Replacement Demonstration
	Armadale Station	Viaduct	Viaduct Structure - Temp Support - Bearing Replacement Demonstration
Trial Build - Design Package	Armadale Station	Viaduct	Viaduct Structure - Temp Support - Column & Headstock Trail Build
	Armadale Station	Viaduct	Viaduct Structure - Temp Support - Girder in Precast Yard
	Armadale Station	Viaduct	Viaduct Structure - Temp Support - Columns in Precast Yard
	Armadale Station	Viaduct	Viaduct Structure - Temp Support - Headstock in Precast Yard
Abutment & Wingwall FRP	Armadale Station	Viaduct	Abutment & Wingwall - Pile Cap Formwork - Abutments

- Formwork Package	Armadale Station	Viaduct	Abutment & Wingwall - Column Formwork - Abutments
	Armadale Station	Viaduct	Abutment & Wingwall - Approach Slab Formwork - Abutments
Viaduct Precast Installation - Package	Armadale Station	Viaduct	Abutment & Wingwall - Propping Design for precast panels
	Armadale Station	Viaduct	Abutment & Wingwall - Working at heights - Temporary handrails
	Armadale Station	Viaduct	Abutment & Wingwall - Scaffold - Access to the top of abutment
	Armadale Station	Approach Ramps	Retaining Walls - Precast - Propping Design
	Armadale Station	Approach Ramps	Retaining Walls - Precast - Crane Pads
	Armadale Station	Approach Ramps	Retaining Walls - Precast - Lift Design (Review of Precast lift plan / rotations)
	Armadale Station	Approach Ramps	Retaining Walls - Edge Protection - Temporary Handrails
	Armadale Station	Approach Ramps	Retaining Walls - Insitu - Formwork Design
Lift Shaft - Temporary Works (Various)	Armadale Station	Station Platforms	Station Platform - Edge Protection - Temporary Handrails
	Armadale Station	Station Platforms	Station Platform - Formwork - Topping slab edges
	Armadale Station	Station Platforms	Station Platform - Edge Protection - ATF Fencing including any temporary bonding
	Armadale Station	Station Platforms	Station Platform - Edge Protection - Lift shaft Handrails
	Armadale Station	Station Platforms	Station Platform - Platform Stairs - Temporary Stringer Support
	Armadale Station	Station Platforms	Station Platform - Platform Stairs - Temporary Stairs Support
	Armadale Station	Station Platforms	Station Platform - Platform Stairs - Temporary Handrails
	Armadale Station	Station Platforms	Station Platform - Lift Shaft - Excavation shoring
	Armadale Station	Station Platforms	Station Platform - Lift Shaft - Formwork Design
Armadale Station - Demolition TW and	Armadale Station	Station Platforms	Assessment of framing and rigging arrangement for lifting lift shaft frame
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - Platform and Concourse Canopy Roof

Demolition Staging	Armadale Station	Existing Station Buildings	Demolition Sequencing - Platform and Concourse Canopy Roof
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - Concourse, Headstocks, Stairs & DDA Ramp Concrete Structure
	Armadale Station	Existing Station Buildings	Demolition Sequencing - Concourse, Headstocks, Stairs & DDA Ramp Concrete Structure
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - Lift Shaft Structure
	Armadale Station	Existing Station Buildings	Demolition Sequencing - Lift Shaft Structure
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - TRANSWA office buildings
	Armadale Station	Existing Station Buildings	Demolition Sequencing - TRANSWA office buildings
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - Platform Buildings
	Armadale Station	Existing Station Buildings	Demolition Sequencing - Platform Buildings
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - Aerial Building and Steel Structure
	Armadale Station	Existing Station Buildings	Demolition Sequencing - Aerial Building and Steel Structure
	Armadale Station	Existing Station Buildings	Temp Propping - Demolition - Existing Bus Canopies
	Armadale Station	Existing Station Buildings	Demolition Sequencing - Existing Bus Canopies
	Armadale Station	Existing Station Buildings	3rd Party TWD Review - All High-Risk Demolition Activity Sequencing & TW
Site Establishment - Package	Church Ave	Utility Diversions	Excavation Trench Support - Trench Box Solution
	Church Ave	Construction Area Set Up	Temp Road Barriers & Fencing (Road Crossing Works)

Pile / Crane Pads - AREA 1	Church Ave	Bridge Embankments & Wingwall - Rail over Road (Abutment has moved)	Piling / Crane Platforms - Bridge Abutment & Wingwall Construction (AREA 1)
	Church Ave	Bridge Embankments & Wingwall (East)	Service Protection Assessment Piling Platforms (Stage 1 Platforms AREA 1)
	Church Ave	Bridge Embankments & Wingwall (East)	Viaduct Structure - Piling / Crane Platforms Expansion (Stage 2 Platforms AREA 1)
	Church Ave	Temp Access Road	Temp Access Road & Laydown - Temp Road Solution - Bridge Abutment & Wingwall Construction
Piles	Church Ave	Viaduct	Viaduct Structure - Pile Cage - Welding of Cages for Lifting
	Church Ave	Viaduct	Viaduct Structure - Pile Cage - Cage Support Trapper Bars
	Church Ave	Viaduct	Viaduct Structure - Pile Cage - Lift Plans / Rigging Plans
	Church Ave	Viaduct	Viaduct Structure - Pile Hole - Edge Protection / Engineered Lid
Abutment & Wingwall FRP - Formwork Package	Church Ave	Bridge Embankments & Wingwall (East)	Excavation Shoring - Pile Cap Excavations - Bridge Abutment & Wingwall Construction
	Church Ave	Bridge Embankments & Wingwall (East)	Formwork - Pile Cap Construction - Bridge Abutment & Wingwall Construction
	Church Ave	Bridge Embankments & Wingwall (East)	Formwork - Column Construction - Bridge Abutment
	Church Ave	Bridge Embankments & Wingwall (East)	Formwork - Column Capping Beam Construction - Bridge Abutment
	Church Ave	Bridge Embankments & Wingwall (East)	Formwork - Stitch embankment walls to bridge walls

	Church Ave	Bridge Embankments & Wingwall (East)	Formwork - Approach Slab
Precast Propping & Access	Church Ave	Level Crossing Removal	Traffic Control - Contraflow traffic for two stage removal of level crossing
	Church Ave	Bridge Embankments & Wingwall (East)	Temporary Access Scaffold - Column Construction - Bridge Abutment
	Church Ave	Bridge Embankments & Wingwall (East)	Temp Propping - RECO precast concrete panel install - Bridge Abutment
	Church Ave	Bridge Embankments & Wingwall (East)	Temp Access Scaffold - RECO precast concrete panel install - Bridge Abutment
Pile / Crane Pads - Road Crossing	Church Ave	Bridge Embankments & Wingwall (East)	Cranes & Lifting - Crane Pad Foundation Construction - RECO Wall Construction Church Ave Pavement Shoulder
	Church Ave	Bridge Embankments & Wingwall (East)	Cranes & Lifting - Crane Pad Foundation Sign Off - RECO Wall Construction Church Ave Pavement Shoulder
Site Establishment - Package	Armadale Road	Utility Diversions	Excavation Trench Support - Trench Box Solution
	Armadale Road	Construction Area Set Up	Temp Road Barriers & Fencing
Pile / Crane Pads - AREA 6	Armadale Road	Bridge Embankments & Wingwall - Rail over Road (Abutment has moved)	Piling / Crane Platforms - Bridge Abutment & Wingwall Construction (AREA 6)
	Armadale Road	Bridge Embankments & Wingwall (East)	Service Protection Assessment Piling Platforms (Stage 1 Platforms AREA 6)
	Armadale Road	Temp Access Road	Temp Access Road & Laydown - Temp Road Solution - Bridge Abutment & Wingwall Construction
Piles	Armadale Road	Viaduct	Viaduct Structure - Pile Cage - Welding of Cages for Lifting

	Armadale Road	Viaduct	Viaduct Structure - Pile Cage - Cage Support Trapper Bars
	Armadale Road	Viaduct	Viaduct Structure - Pile Cage - Lift Plans / Rigging Plans
	Armadale Road	Viaduct	Viaduct Structure - Pile Hole - Edge Protection / Engineered Lid
Abutment & Wingwall FRP - Formwork Package	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Excavation Shoring - Pile Cap Excavations - Bridge Abutment & Wingwall Construction
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Formwork - Pile Cap Construction - Bridge Abutment & Wingwall Construction
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Formwork - Column Construction - Bridge Abutment
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Formwork - Column Capping Beam Construction - Bridge Abutment
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Formwork - Stitch embankment walls to bridge walls
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Formwork - Approach Slab
Precast Propping & Access	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Temporary Access Scaffold - Column Construction - Bridge Abutment
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Temp Propping - RECO precast concrete panel install - Bridge Abutment

	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Temp Access Scaffold - RECO precast concrete panel install - Bridge Abutment
Pile / Crane Pads - Road Crossing	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Cranes & Lifting - Crane Pad Foundation Construction - RECO Wall Construction Church Ave Pavement Shoulder
	Armadale Road	Bridge Embankments & Wingwall - Rail over Road	Cranes & Lifting - Crane Pad Foundation Sign Off - RECO Wall Construction Church Ave Pavement Shoulder
	Armadale Road	Level Crossing Removal	Traffic Control - Contraflow traffic for two stage removal of level crossing
	Forrest Road	Level Crossing Removal	Traffic Control - Contraflow traffic for two stage removal of level crossing

Appendix D: Staging diagrams

Table 3: Staging diagrams register – Note: Staging Diagrams are Listed North to South Along the Viaduct

Item	Name
1.	North Earth Ramp (south Ramp Similar) – Staging & Construction Method Rev. D
2.	Armadale Road Area – Staging & Construction Method Rev. D
3.	Aragon Court – Staging & Construction Method Rev. D
4.	Forrest Road – Staging & Construction Method Rev. D
5.	Armadale Station – Staging & Construction Method Rev. D
6.	Church Avenue – Staging & Construction Method Rev. D
7.	Hobbs Drive – Staging & Construction Method Rev. D

STAGE 1 – SITE ESTABLISHMENT / Rail Demolition

Construction Staging - Concept
Aston Williams

Stage 1 – Rail Demolition

Site Boundaries:

- Existing pedestrian rail crossing shall be closed permanently In this location
  (Local authority to be coordinated with / reroute of foot traffic)

Rail Demolition:

- Decommission / Remove all Rail electrical / Coms Assets
- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

Geotechnical Testing:

- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

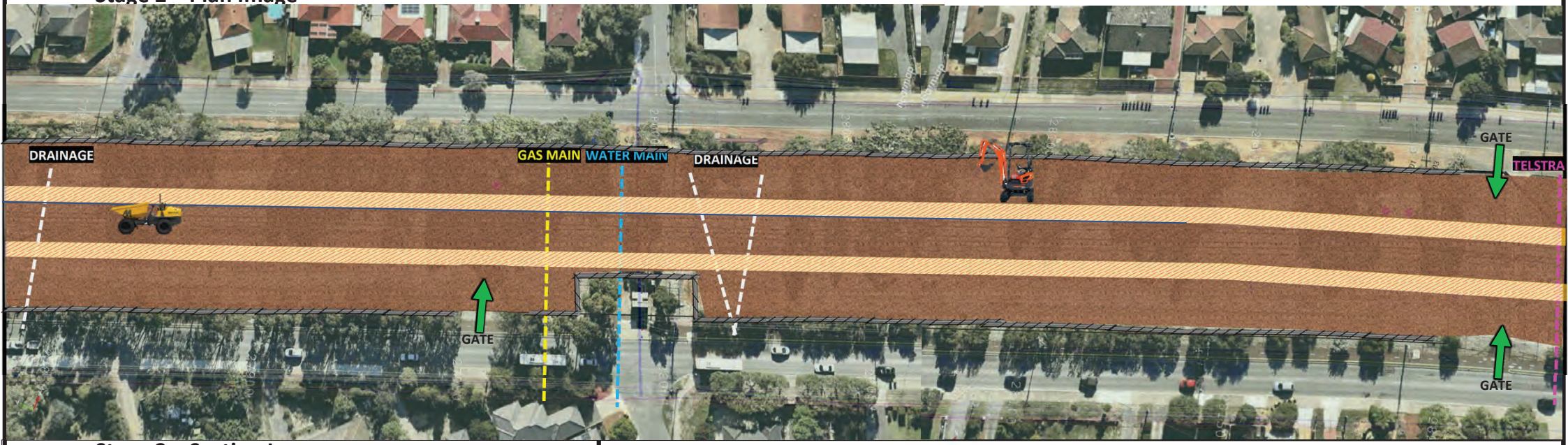
Demolition Notes:

Construction Staging - Concept
Aston Williams

STAGE 2 – CIVILS / SERVICES
(Trench Excavation / Service Adjustments)

MetCONNX

Stage 2 – Plan Image



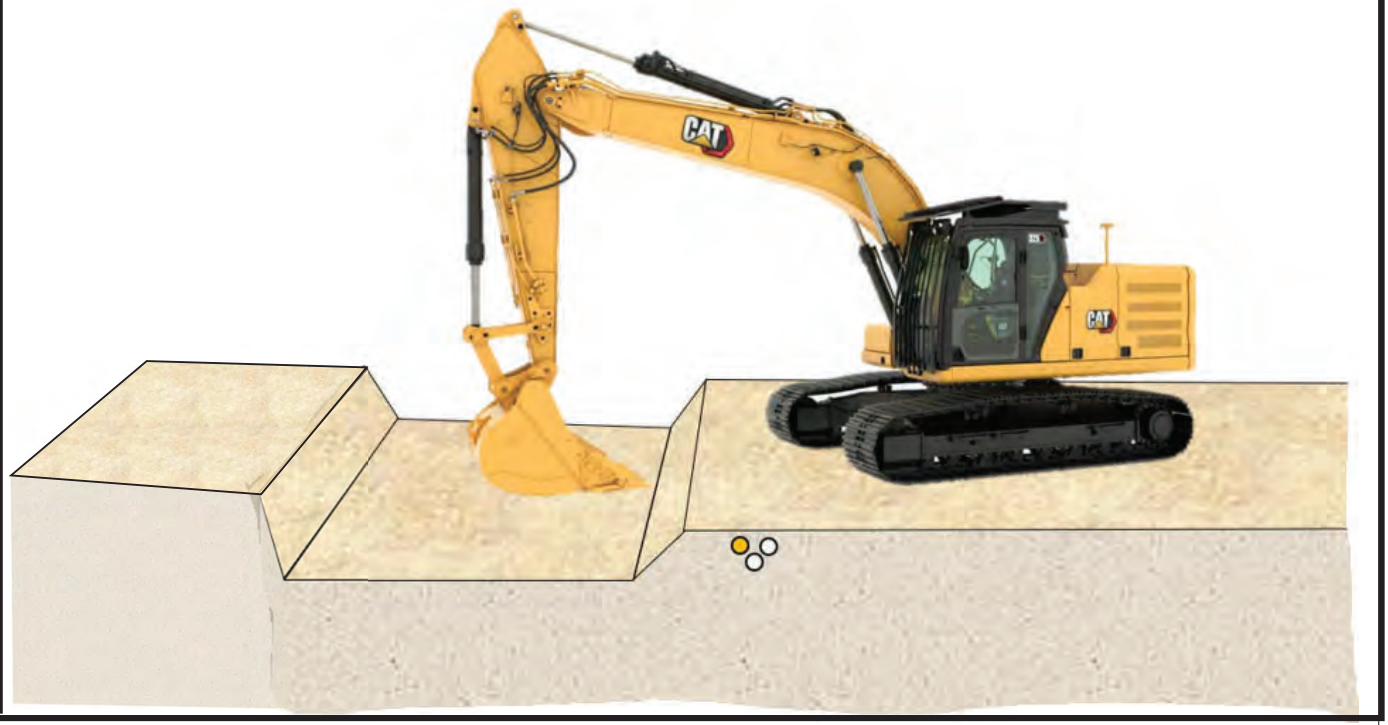
Stage 2 – Section Image

- Services team to identify all services which will remain within work zone.
- Services team to complete installation of any new services in area (**TBC**)
- CIVILS team to complete foundation works for new earth ramp
- CIVILS team to complete excavation and preparation of retaining wall trenches to occur to required precast footing depths.

Any Remaining Assets within zone are to be Relocated / Constructed to Suit Final Detail:

NOTES* : Special Cases for Crossing Assets

- TELSTRA (NO ISSUE – Sits outside of construction zone)
- WATER MAIN (ISSUE IDENTIFIED – Design needs to incorporate self-supported slab to allow no loading on existing pipe by retaining wall and access for future replacement of pipe).
- GAS MAIN (ISSUE Potential – Gas main structural inspection to confirm that it is structurally acceptable for construction & loading of retaining wall above it. Else design to incorporate self-supported slab in this zone to prevent loading.
- DRAINAGE (ISSUE Potential – Drainage crosses under retaining wall at various locations depth of drainage to be confirmed and design to confirm that there is no issue with loading these locations with retaining wall / construction weights).



Construction Staging - Concept
Aston Williams

STAGE 3 – Pad
(Retaining Wall Foundation Blinding / Crane Pad Construction / Service Protection)

MetCONNX

Stage 3 – Plan Image

Stage 3 – Section Image

Service Protection Details:

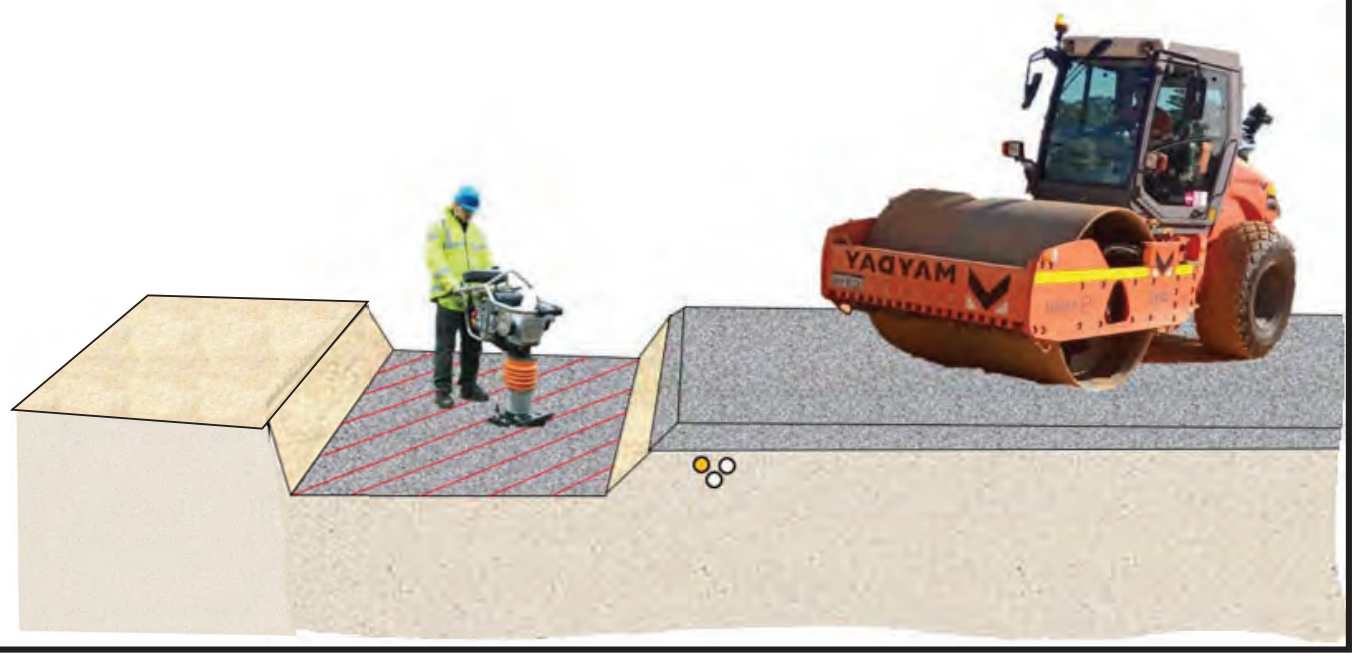
- CIVILS/Structures team to complete any permanent works protection slabs or similar over existing / new service locations.

Retaining Wall Foundations:

- Ground preparation works (CIVILS) – Placement of suitable fill (If required) & compaction of retaining wall foundations.
- Construction of any service protection slabs / plates
  (Where required for below ground crossings)
- Pour of concrete blinding slab (Set to 40mm below underside of precast level)

Crane Pad:

- Service Protection temporary works to be put in place where services are identified as at risk from loads or exposed service pits need to be built over.
- Construction of crane pad / haulage road for upcoming precast lift activities.

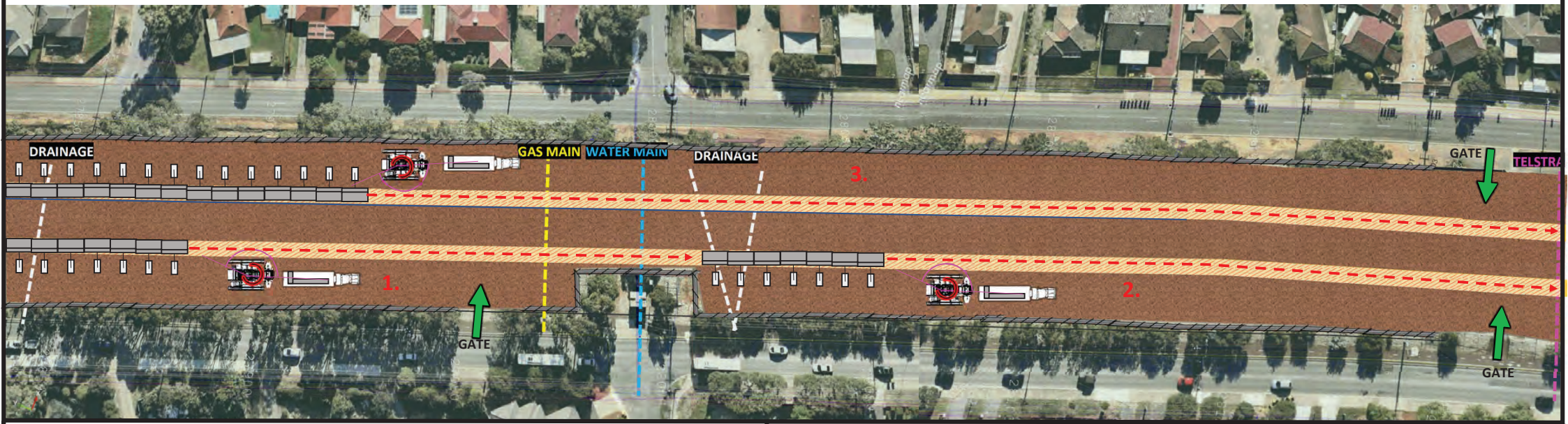


Construction Staging - Concept
Aston Williams

STAGE 4 – Precast Installation
(Crane Operations / Precast Deliveries)

MetCONNX

Stage 4 – Plan Image

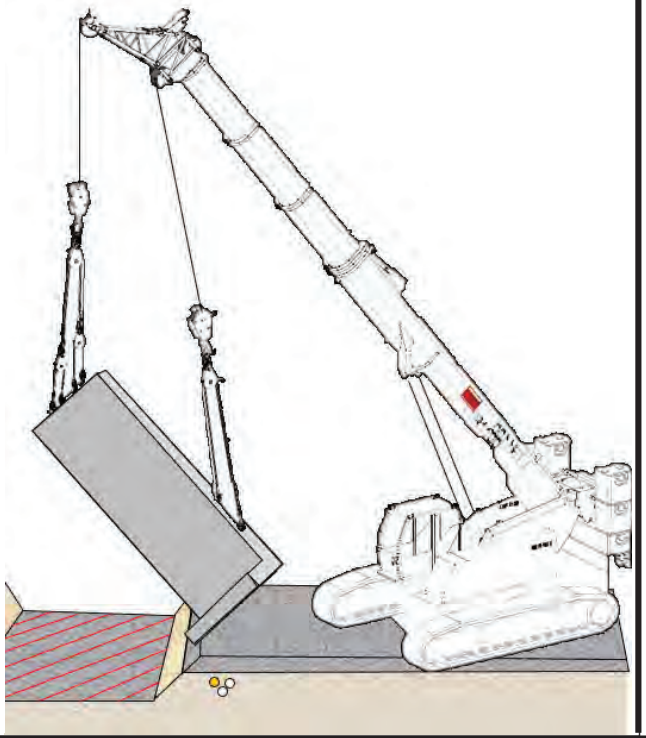


Stage 4 – Section Image A

Installation shall occur from North to South
Additional gates required at southern end to ensure egress for plant / equipment.

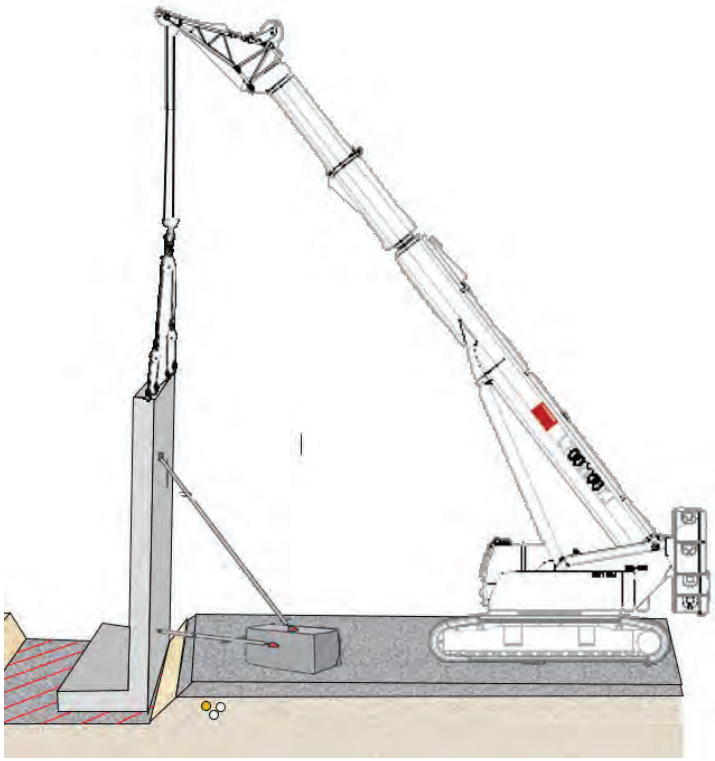
X3 Installation Zones / Runs:

- **Precast Unloading**
- **Precast Rotation**



Stage 4 – Section Image B

- **Precast Placement**
- **Precast Propping/ Temporary Support**
  (Prior to release from crane)

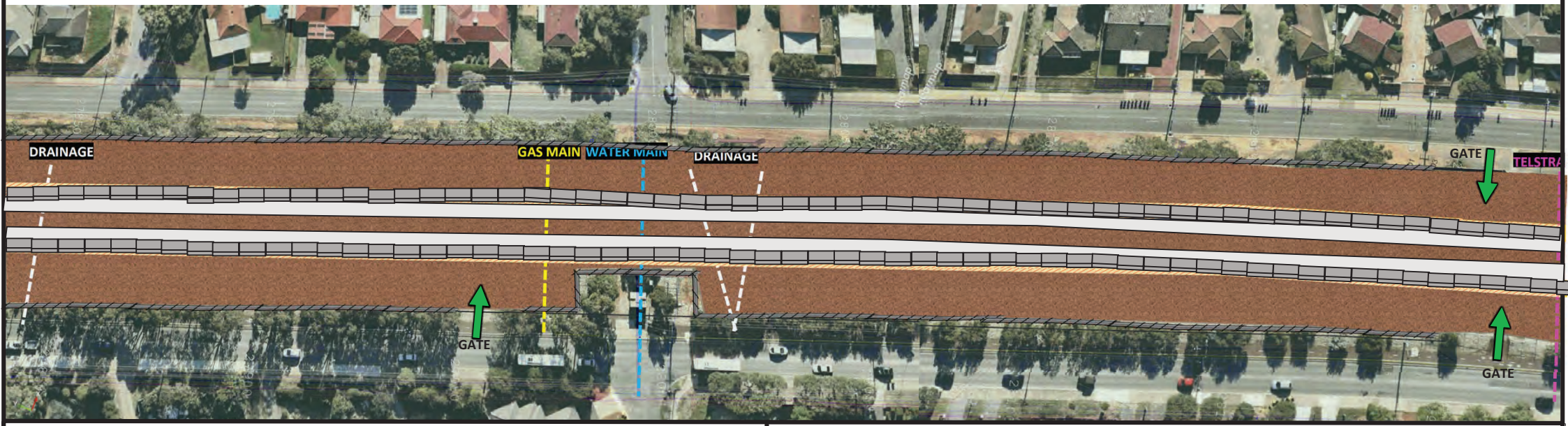


Construction Staging - Concept
Aston Williams

STAGE 5 – Retaining Wall Stitch
(Stitch Pours / Precast Prop Removal)

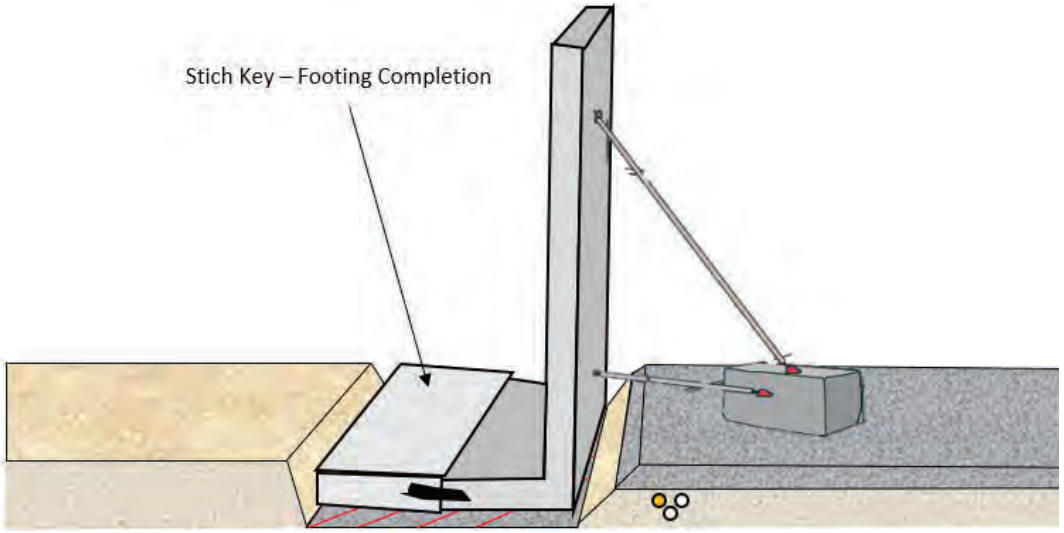
MetCONNX

Stage 5 – Plan Image



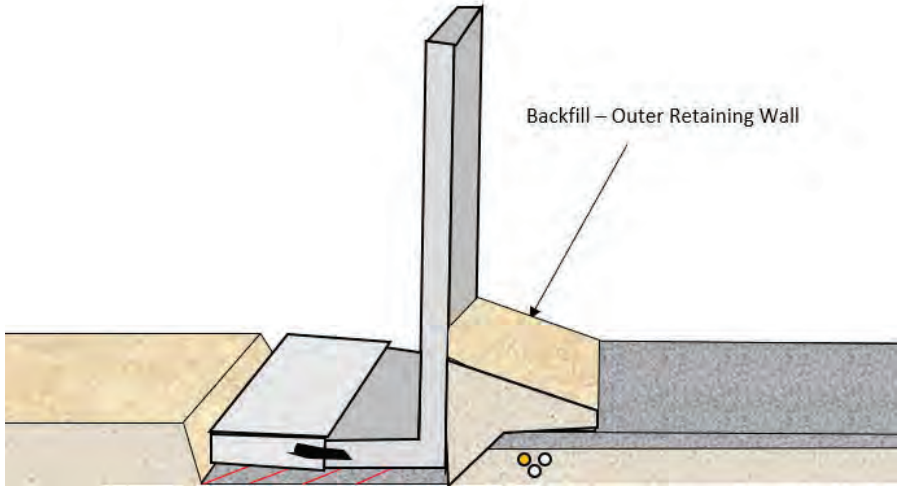
Stage 5 – Section Image A

- **Form / Reo / Pour – Concrete Footing (Key Detail)**



Stage 4 – Section Image B

- **Temporary support removal**
- **Backfill of outer retain wall face**

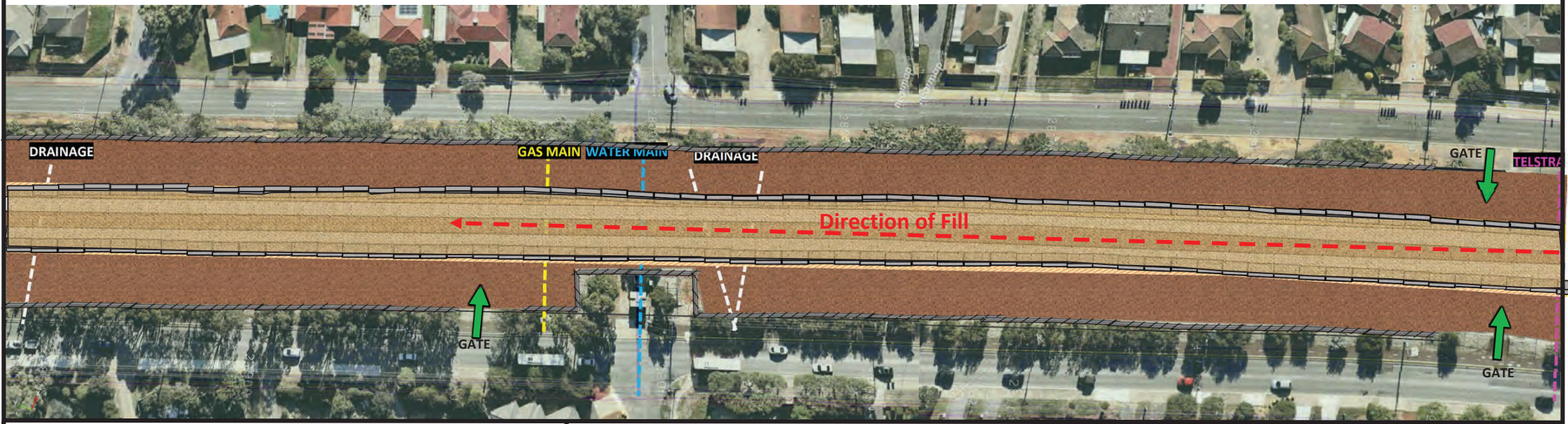


Construction Staging - Concept
Aston Williams

STAGE 6 – Earth Ramp (Backfill & Handrailing)

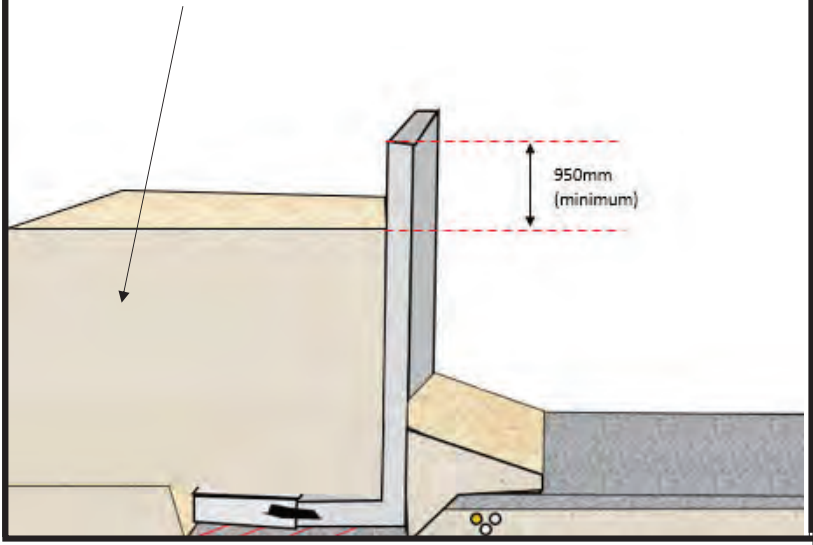
MetCONNX

Stage 6 – Plan Image



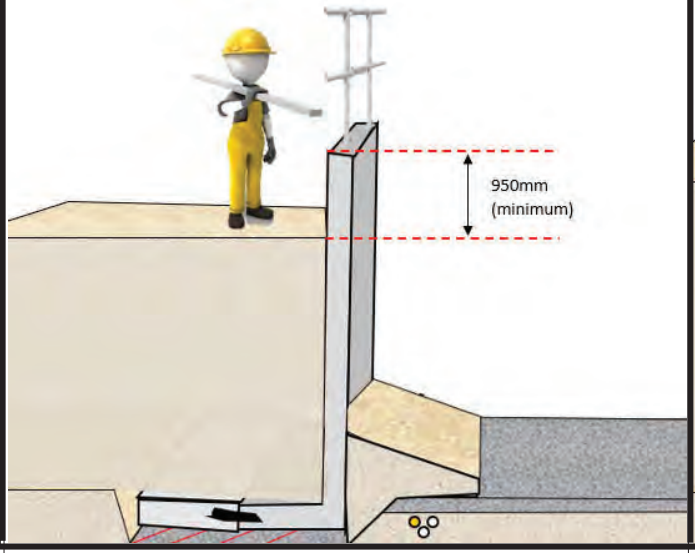
Stage 6 – A (Partial Backfill)

- Stage 1 internal backfill to take place.
- Backfill should only be completed partially – Leaving a 950mm gap between fill level and top of wall.
  (This 950mm will act as temporary edge protection for the ramp zone)



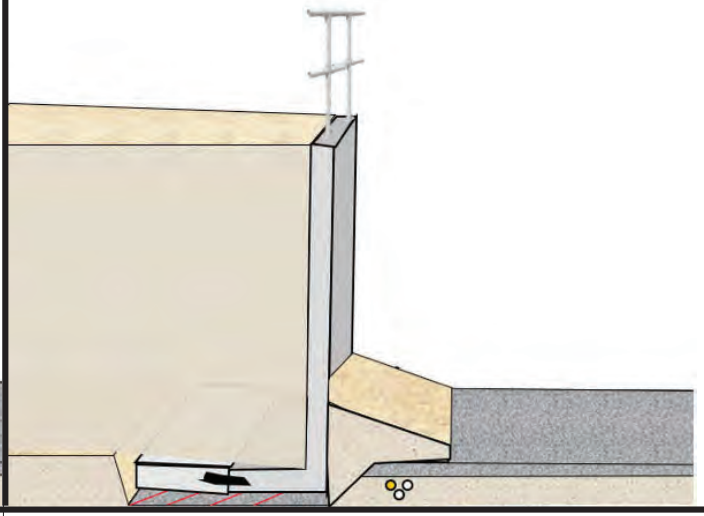
Stage 6 – B (Handrail Installation)

- Working behind existing 950mm retaining wall edge protection
- Installation of permanent handrail to be completed



Stage 6 – C (Backfill Completion)

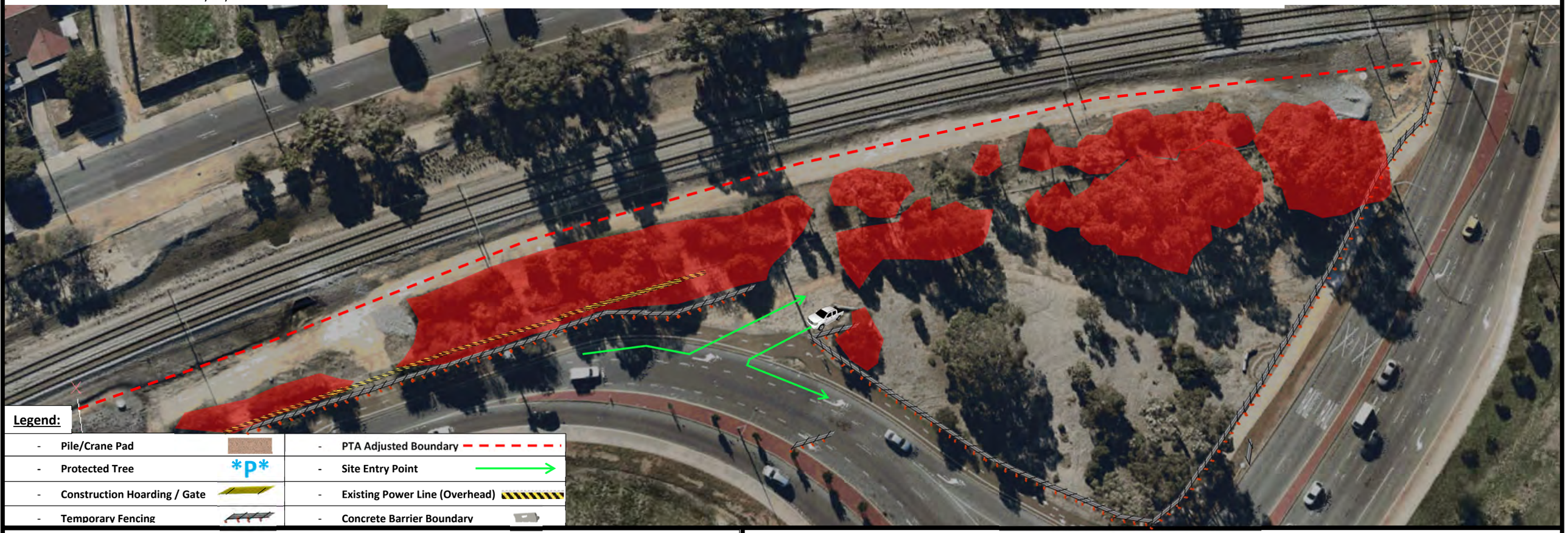
Final backfills to full extent of retaining design to be completed



ARMADALE ROAD EARLY WORKS – Tree Removal (Stage 1)
(Temporary Fencing / PTA Boundary Shift / Tree Removal / Service Instigations)

Construction Staging – Draft
Aston Williams -21/11/22

MetCONNX



Community – Tree Removal / Site Set-Up

Community to be engaged early to coordinate the site set-up location and entry point.

1. Site fencing to be set up around work zone boundaries.
2. Sit entry point to be created off of existing slip lane (Left in – Left Out) – Curb to be dropped if required at this location and signage to warn pedestrians of entering / existing traffic.
3. Removal of Trees within the viaduct construction area.

PTA Boundary Shift – – – – –

1. PTA general exemption fence to be erected / moved as close to rail corridor as allowable, to allow for expansion of site zone
2. Existing PTA fence to be removed / Existing W-Beam to be removed

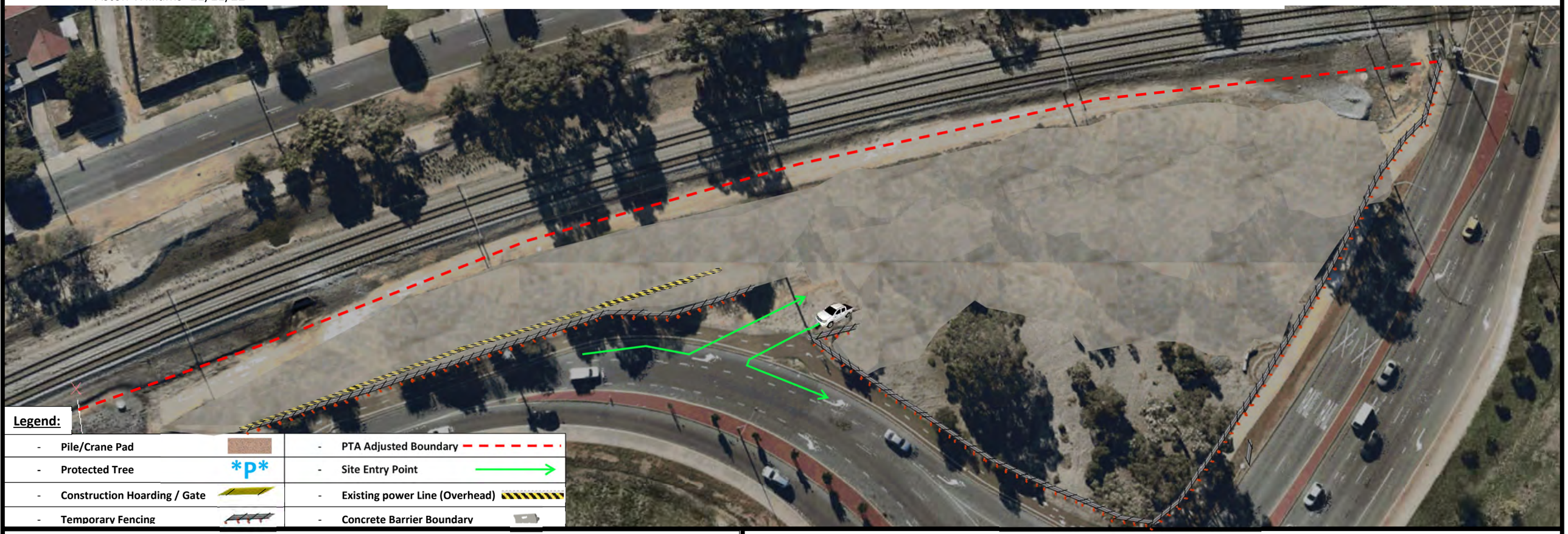
Service Investigations / Clash Planning

1. All pile locations to be verified as either clear or known clash.
2. Where clashes are detected – service investigations shall identify asset owner and plan to be put in place for movement / relocation of service.

Construction Staging – Draft
Aston Williams -21/11/22

ARMADALE ROAD EARLY WORKS – Service Relocation (Stage 2)
(Powerline /Gas Line Relocation Works)

MetCONNX



Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing power Line (Overhead)
-	Temporary Fencing	-	Concrete Barrier Boundary

Service Relocation:

Notes: Section to be expanded to capture extent of service works within this zone.

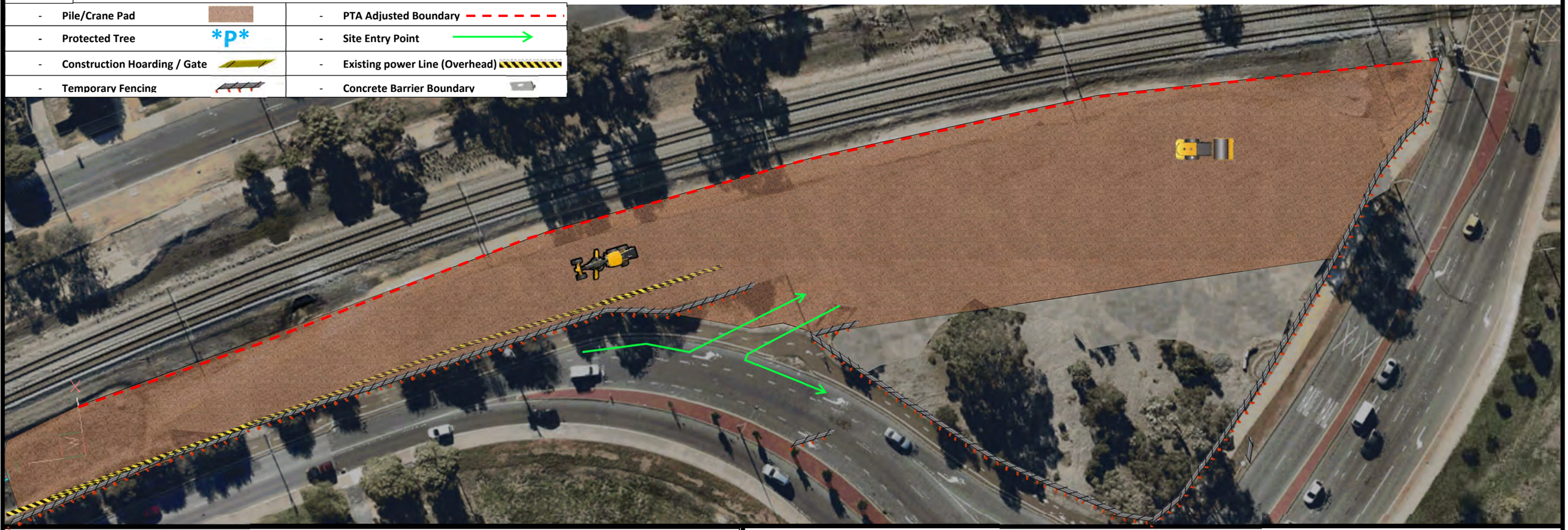
ARMADALE ROAD EARLY WORKS – Pile / Crane Pad (Stage 3)
(Construction of Crane Pad)

MetCONNX

Legend:

Construction Staging – Draft
Aston Williams -21/11/22

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing power Line (Overhead)
-	Temporary Fencing	-	Concrete Barrier Boundary



Mobilization of Plant and Materials:

- All plant & material deliveries shall occur via the Green Avenue main site access gate.

Services Relocation / Protection:

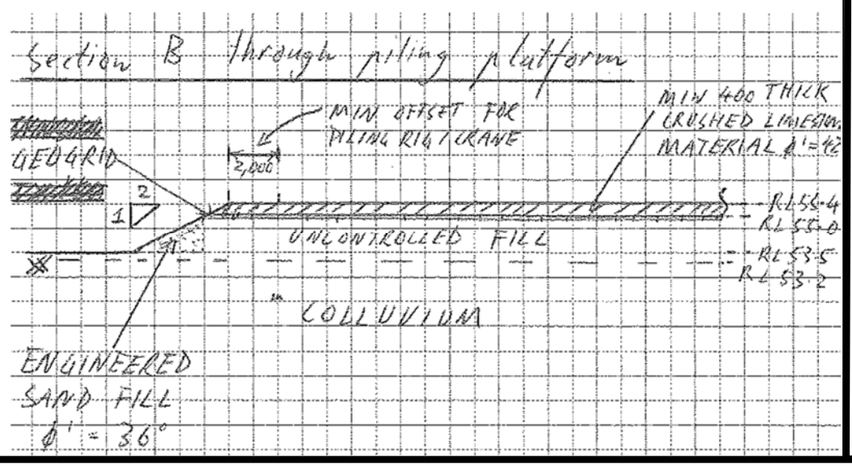
- Services assessment shall take place as part of the crane pad design to determine extent of protection to be put in place.
- Any additional service protection required based on design assessment shall be put in place at time of pad Construction.

Pad / Access Ramp Construction

- Build-up of limestone material along PTA edge of pad shall be established to provide physical barrier separation for all plant.

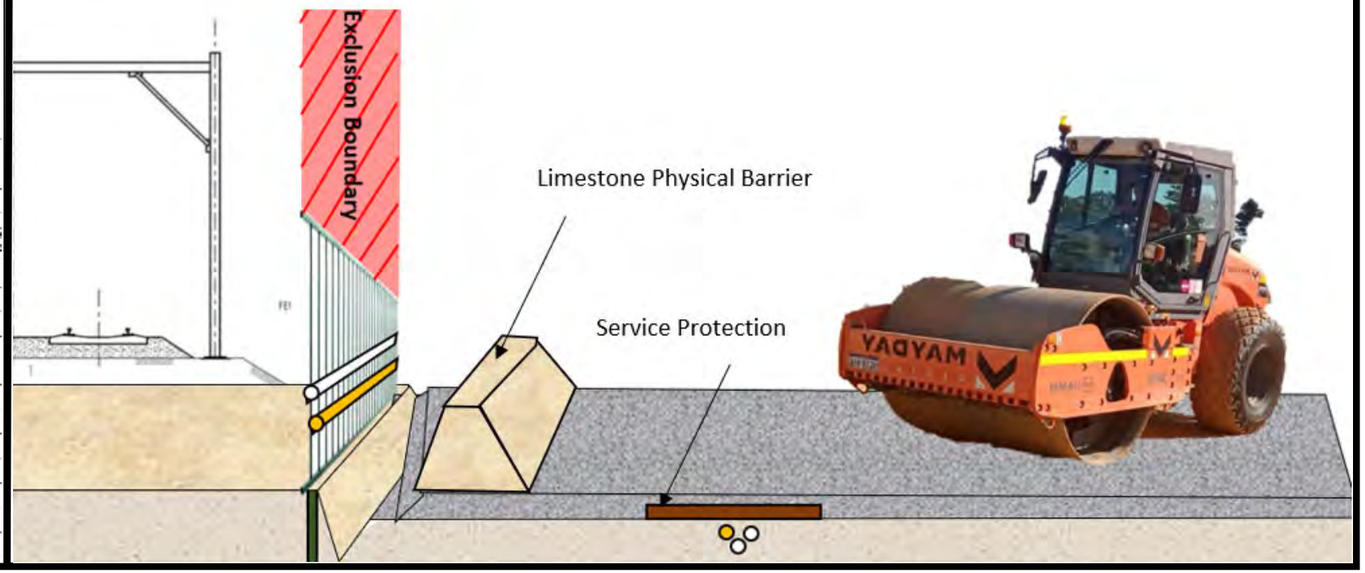
- Extent of pad shall be minimum of 23m wide from the closest pile location.

- Pad design shall consider existing rail corridor drainage and make allowances to ensure its functionality remain.



Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



ARMADALE ROAD EARLY WORKS – Piling Works (Stage 4)
(Pile Construction)

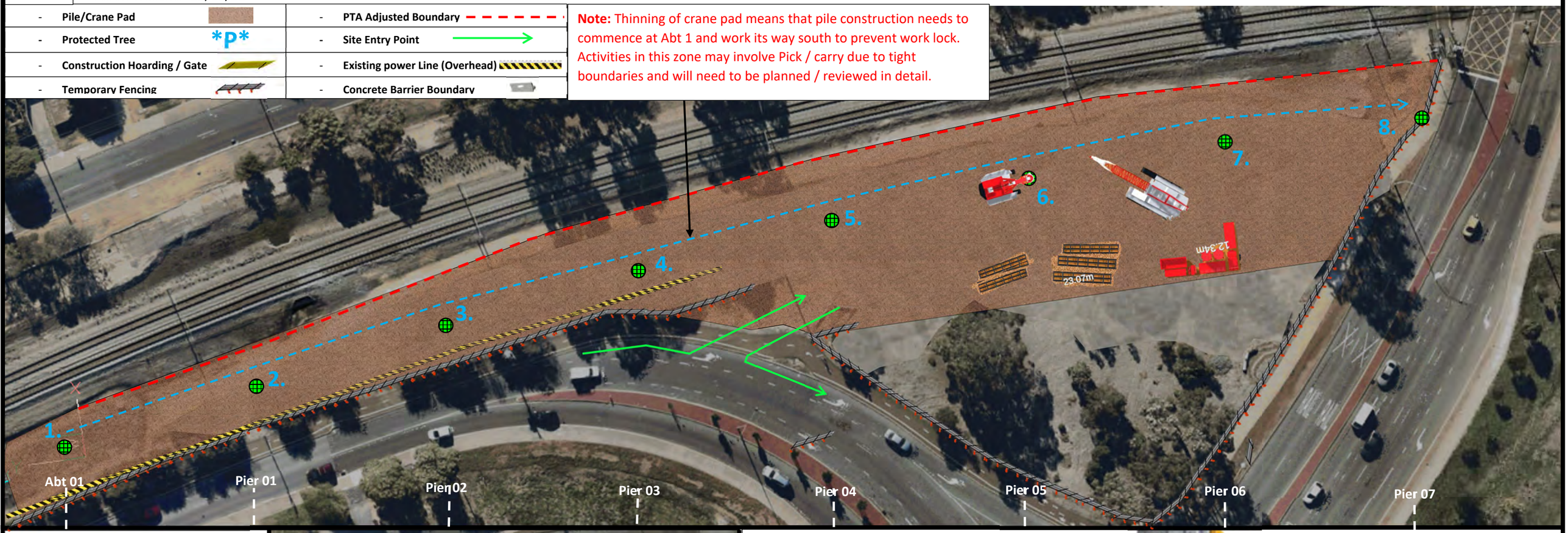
MetCONNX

Legend:

Construction Staging – Draft
Aston Williams -21/11/22

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing power Line (Overhead)
-	Temporary Fencing	-	Concrete Barrier Boundary

Note: Thinning of crane pad means that pile construction needs to commence at Abt 1 and work its way south to prevent work lock. Activities in this zone may involve Pick / carry due to tight boundaries and will need to be planned / reviewed in detail.



Pedestrian Path / Single Lane Closure:

In order to safely complete the construction of pile (Pier 07 – W) the following coordination will be required.

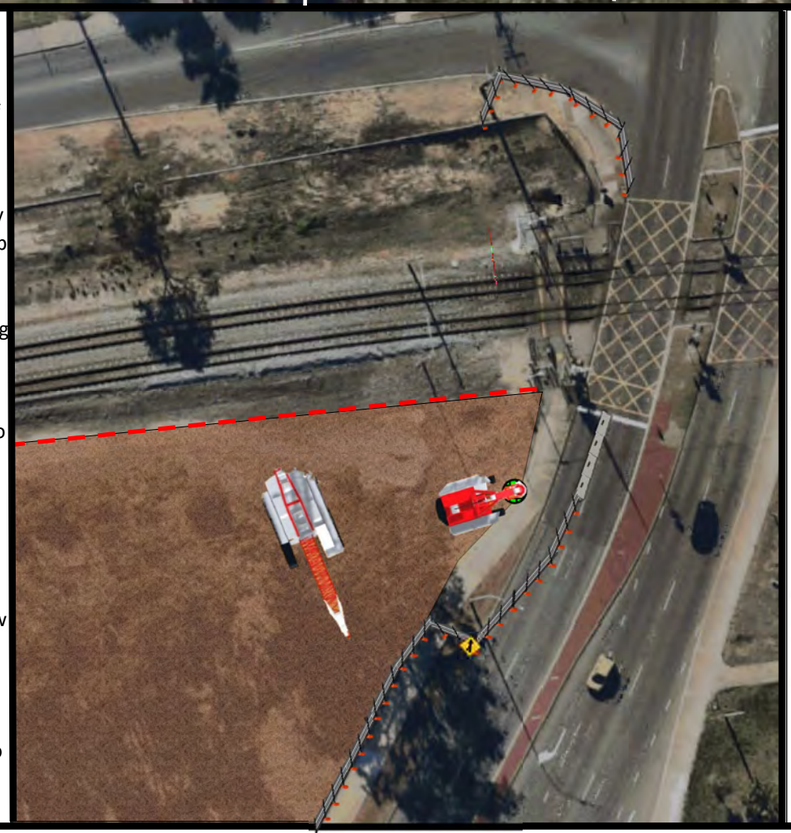
- Temporary closure of the pedestrian pathway in this location. Requiring fencing to be set up on both sides of the exiting pedestrian rail crossing. All pedestrians should be directed back towards the nearby intersection crossing and across the road to utilize alternative route.

-Temporary closure of the single lane closest to site. Traffic should be directed to merge into the right-hand lane prior to the rail crossing.

Note:

Single lane Closures can be completed at the time of works and returned to usual traffic flow at the end of shift.

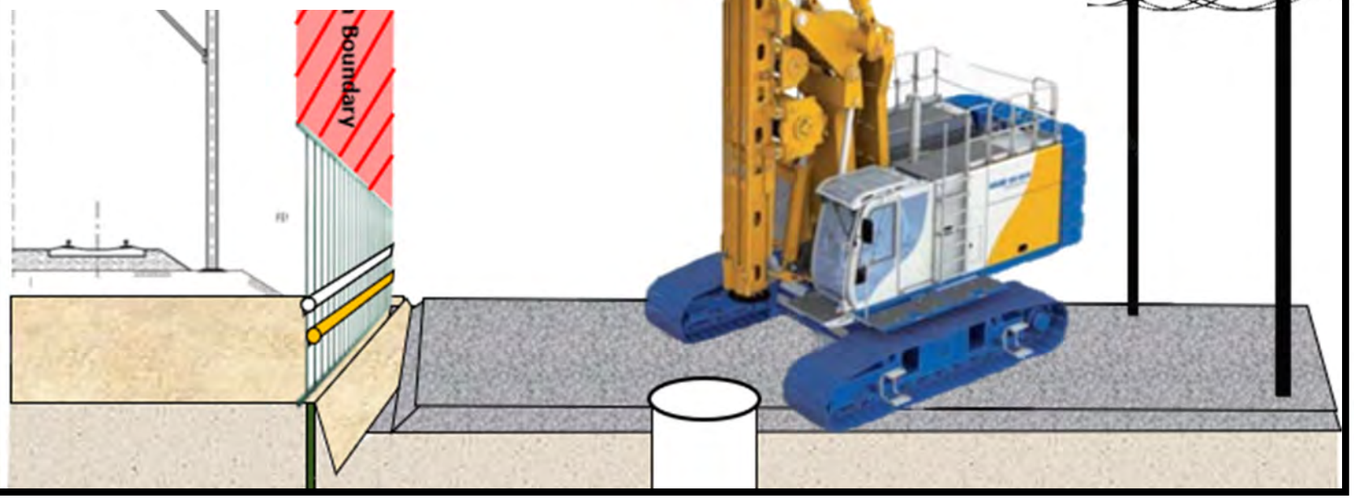
Pedestrian pathway will be required to remain closed for a prolonged period, until concrete has set / site has been made safe. May need to remain closed for ease of follow on activities.



Piling Notes:

1.Pier 03 to Abt 01 Proximity to Electrical infrastructure:
- There is an existing electrical line running along the Western pedestrian path for the extent of Pier 03 to Abt 01.
All piling & crane operations within this range will need to manage this risk as part of their planning / execution.

2. Pier 07 Proximity to Pedestrian Path & Road:
- Due to proximity of works for pile 07. Pedestrian path closure is required, and single lane closure is likely required.



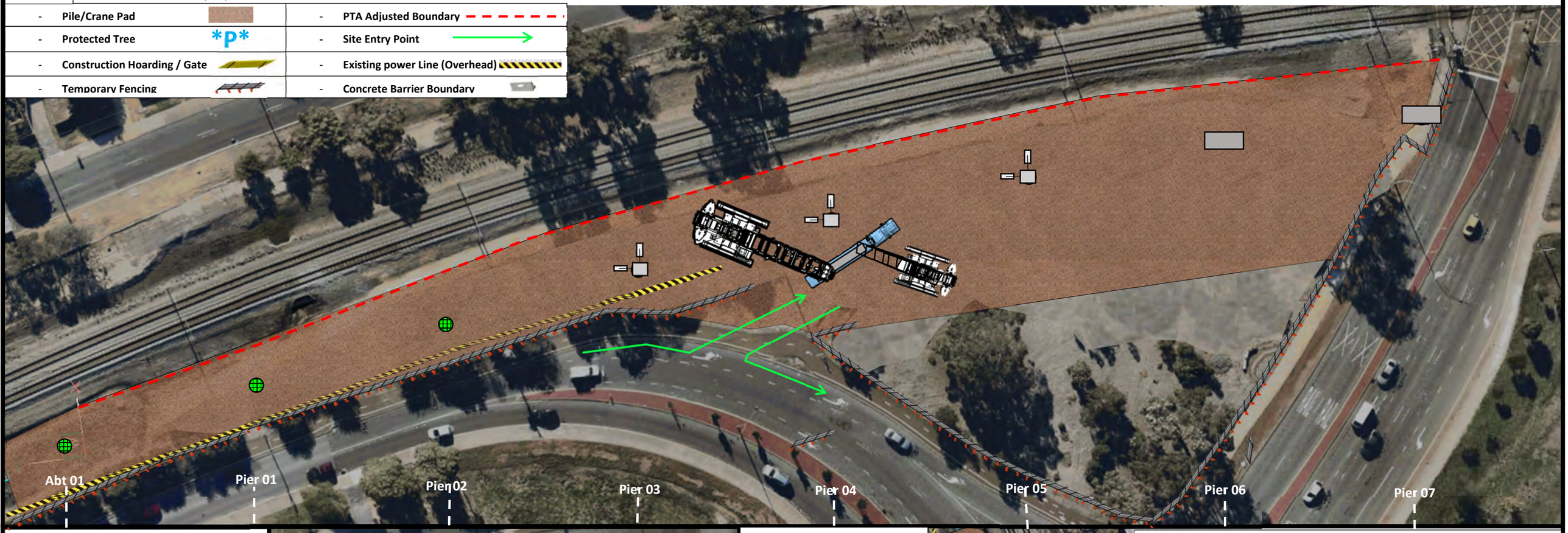
ARMADALE ROAD EARLY WORKS – Column Install (Stage 5)
(Precast Installation / Colum & Headstocks)

MetCONNX

Construction Staging – Draft
Aston Williams -21/11/22

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *p*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing power Line (Overhead)
-	Temporary Fencing	-	Concrete Barrier Boundary



Pedestrian Path / Single Lane Closure:
(PIER 07) – Column & Headstock Install

In order to safely complete the construction of column (Pier 07 – W) the following coordination will be required.

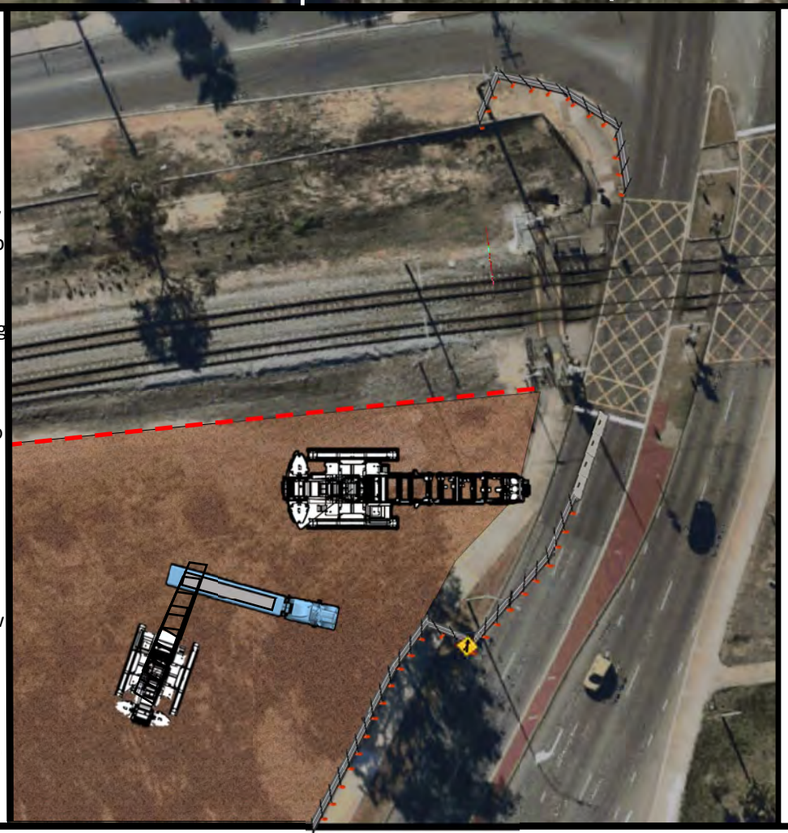
- Temporary closure of the pedestrian pathway in this location. Requiring fencing to be set up on both sides of the exiting pedestrian rail crossing. All pedestrians should be directed back towards the nearby intersection crossing and across the road to utilize alternative route.

-Temporary closure of the single lane closest to site. Traffic should be directed to merge into the right-hand lane prior to the rail crossing.

Note:

Single lane Closures can be completed at the time of works and returned to usual traffic flow at the end of shift.

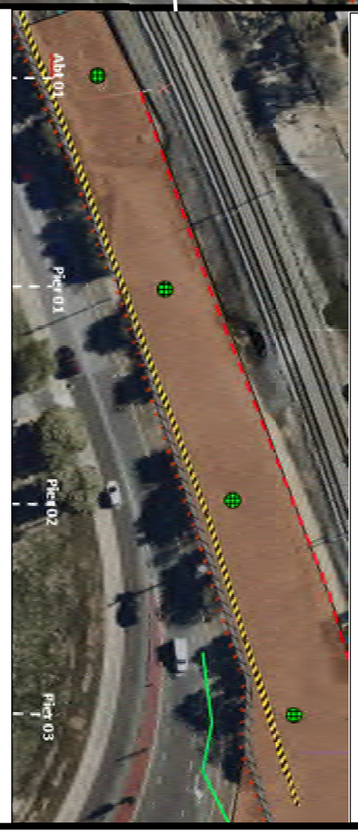
Pedestrian pathway will be required to remain closed for a prolonged period, until concrete has set / site has been made safe. May need to remain closed for ease of follow-on activities.



Precast Install Restriction:

Based on proximity of piles to adjacent PTA / Road boundaries – it is unlikely that precast installation will be able to take place in this zone outside of the possession.

If the crane pad is able to be built to an extent in this zone large enough for the 300T crane or a smaller alternative capable of lifting columns / headstocks, then Pick & carry operations may be an option (To be looked into)



Precast Installation:

Installation of x5 Columns & x 5 Headstocks - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place + Lane Closure.

Stage A:
- Install Columns Pier 07 / Pier 06 / Pier 05 (Shift 1)
- Grouting to occur for all columns in bay Pier 05 - 07 (Shift 2) - To allow Headstock Stage To Commence
- Install Columns Pier 04 / Pier 03 / Pier 02 (Shift 2)
- Confirm Column grout strength has been achieved to allow for headstock install in peris (Shift 3)

Stage B:
- Install Headstocks Pier 07 / Pier 06 (Shift 4)
- Permanent reo/concrete connection to commence for Pier 06 - 07 (Shift 5)
- Install Headstocks Pier 04 / Pier 05 (Shift 5)
- Permanent reo/concrete connection to commence for Pier 04 – 05 (Shift 6)
- Install Headstocks Pier 03 (Shift 6)
- Permanent reo/concrete connection to commence for Pier 03 (Shift 7)

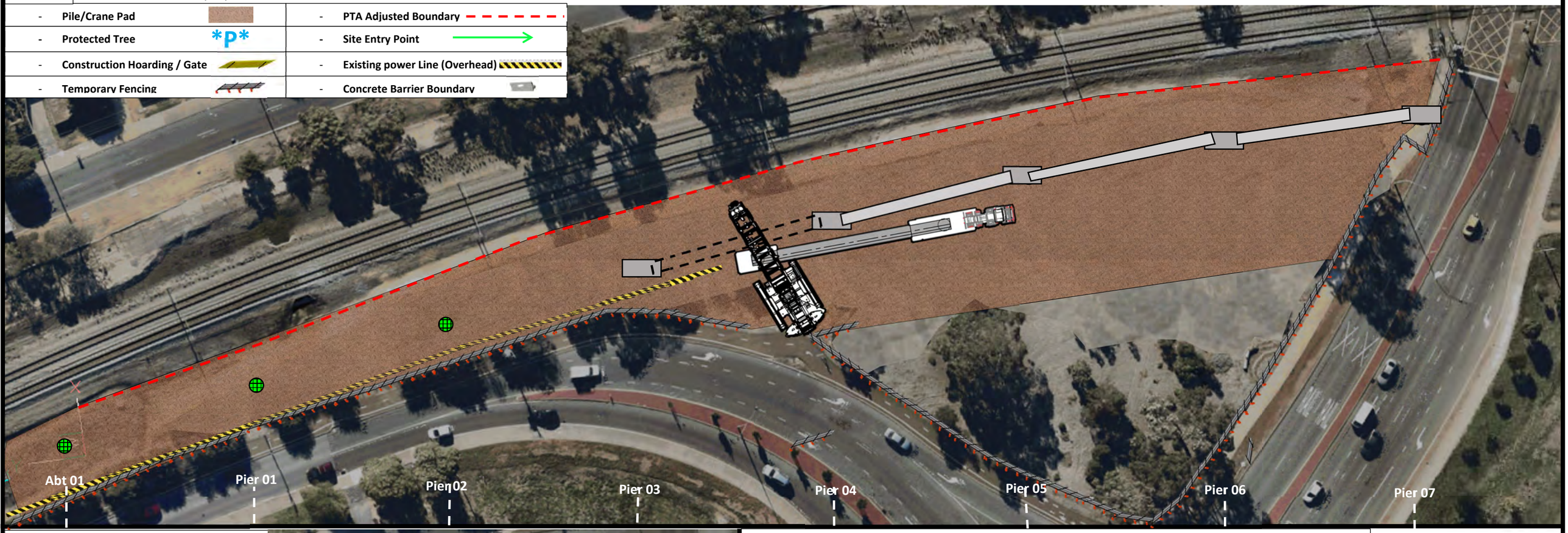
ARMADALE ROAD EARLY WORKS – Beam Install (Stage 6)
(Beam Installation)

MetCONNX

Legend:

Construction Staging – Draft
Aston Williams -21/11/22

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *p*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing power Line (Overhead)
-	Temporary Fencing	-	Concrete Barrier Boundary



Pedestrian Path / Single Lane Closure:

In order to safely complete the installation of precast beam BN07-W

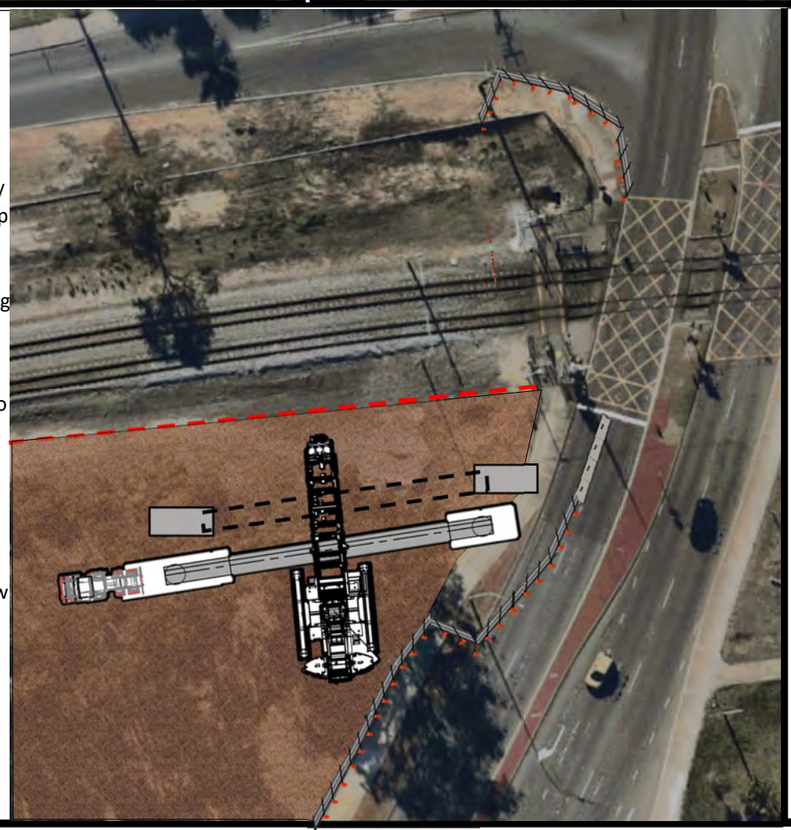
- Temporary closure of the pedestrian pathway in this location. Requiring fencing to be set up on both sides of the exiting pedestrian rail crossing. All pedestrians should be directed back towards the nearby intersection crossing and across the road to utilize alternative route.

-Temporary closure of the single lane closest to site. Traffic should be directed to merge into the right-hand lane prior to the rail crossing.

Note:

Single lane Closures can be completed at the time of works and returned to usual traffic flow at the end of shift.

Pedestrian pathway will be required to remain closed for a prolonged period, until site has been made safe. May need to remain closed for ease of follow-on activities.



Precast Installation:

Installation of x4 Beams -
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage C:

- Verify headstock strength has been achieved for Pier 06 / Pier 07

- Install Beam Bay 06 / 07 (Shift 8) – (BN07-W = 132T)

- Verify headstock strength has been achieved for Pier 05

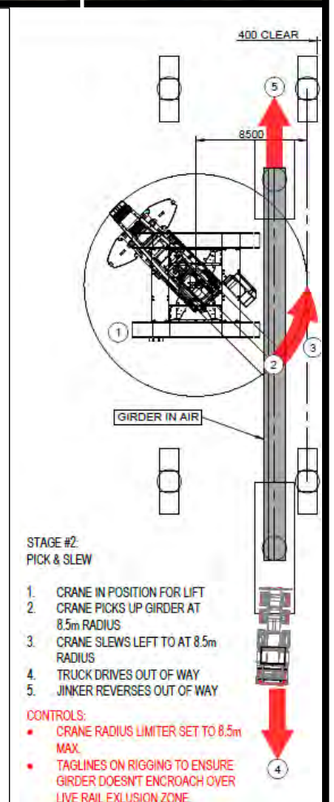
- Install Beams Bay 05 / 06 (Shift 9) – (BN06-W = 133T)

- Verify headstock strength has been achieved for Pier 04

- Install Beams Bay 04 / 05 (Shift 10) – (BN05-W = 115.6T)

- Verify headstock strength has been achieved for Pier 03

- Install Beams Bay 03 / 04 (Shift 11) – (BN04-W = 132T)

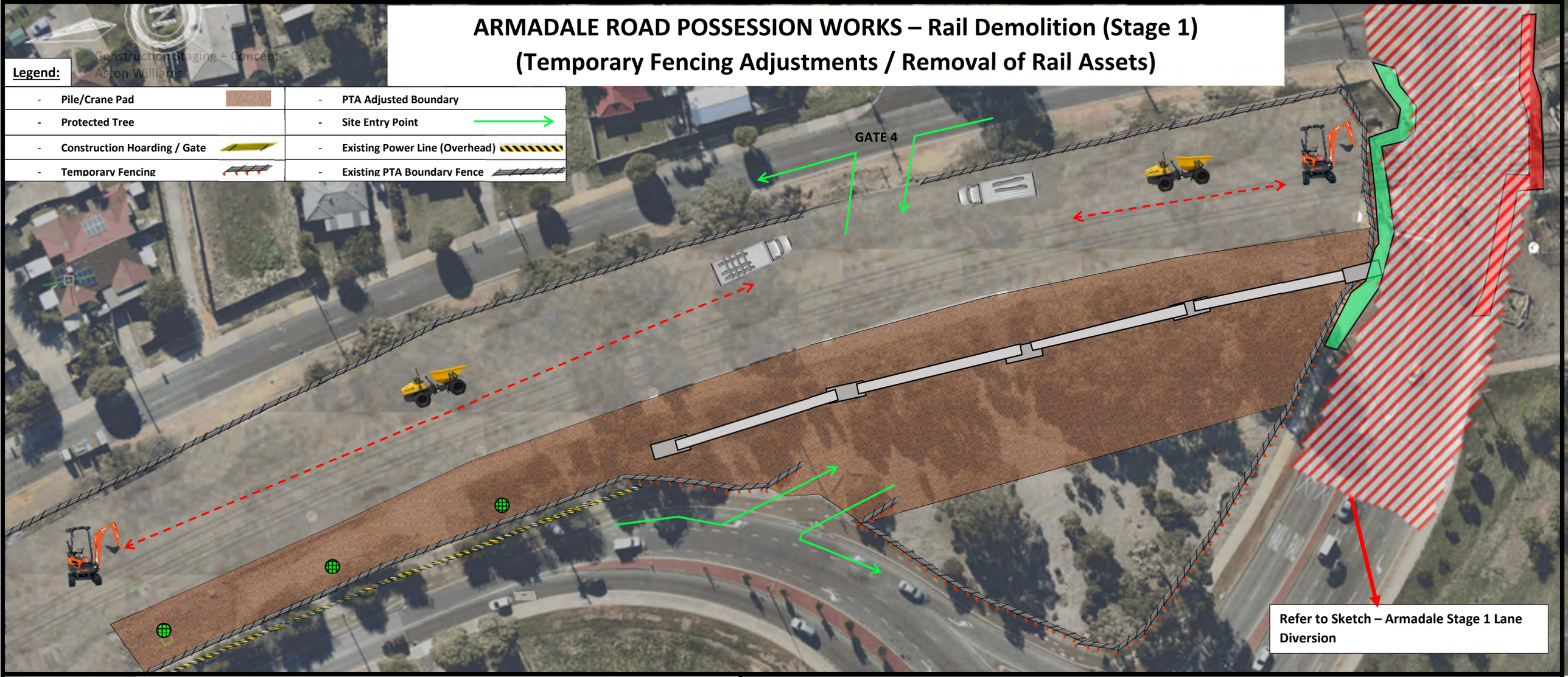


ARMADALE ROAD POSSESSION WORKS – Rail Demolition (Stage 1)
(Temporary Fencing Adjustments / Removal of Rail Assets)

Construction Staging – Concept
Aston Williams

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Power Line (Overhead)
-	Temporary Fencing	-	Existing PTA Boundary Fence



Site Establishment:

- Pedestrian crossing on the North side of Armadale Road should remain open to allow for permanent closure of the pedestrian crossing on the south side of Armadale Road.
Note: Stages of works are likely to require intermediary closures of pedestrian path, Alternative route may need to be provided.

- Set-up southern boundary temporary fencing to take possession of PTA rail zone.

- Establish **GATE 4**

Rail Demolition:

- Decommission / Remove all Rail electrical / Coms Assets

- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

Geotechnical Testing:

- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

Service Investigations / Clash Planning

1. All services within the work zone are to be identified
2. All PTA services to be removed as part of rail decommissioning / demolition
3. Any new or existing permanent services are to be managed
   - Installed if new
   - Relocated where required
   - Protected where below intended work zones (Presence to be considered within Temporary Works Design)

ARMADALE ROAD POSSESSION WORKS – Crane / Piling Pad (Stage 2)
(Protection of Services / Construction of Crane Pad)

Construction Staging – Concept
Aston Williams

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *p*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Power Line (Overhead)
-	Temporary Fencing	-	Existing PTA boundary fence

GATE 4

Refer to Sketch – Armadale Stage 1 Lane Diversion

Mobilization of Plant and Materials:

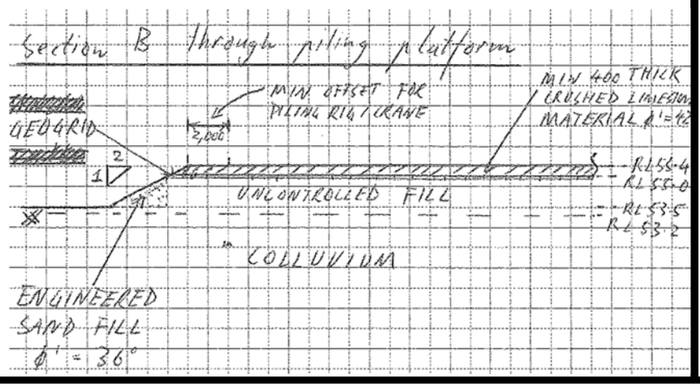
- All plant & material deliveries shall occur via GATE 4

Services Relocation / Protection:

- Services team to identify all services which run within the planned pad construction zone.
- Services to either be relocated / decommissioned or protected via temporary works prior to pad construction

Crane pad construction:

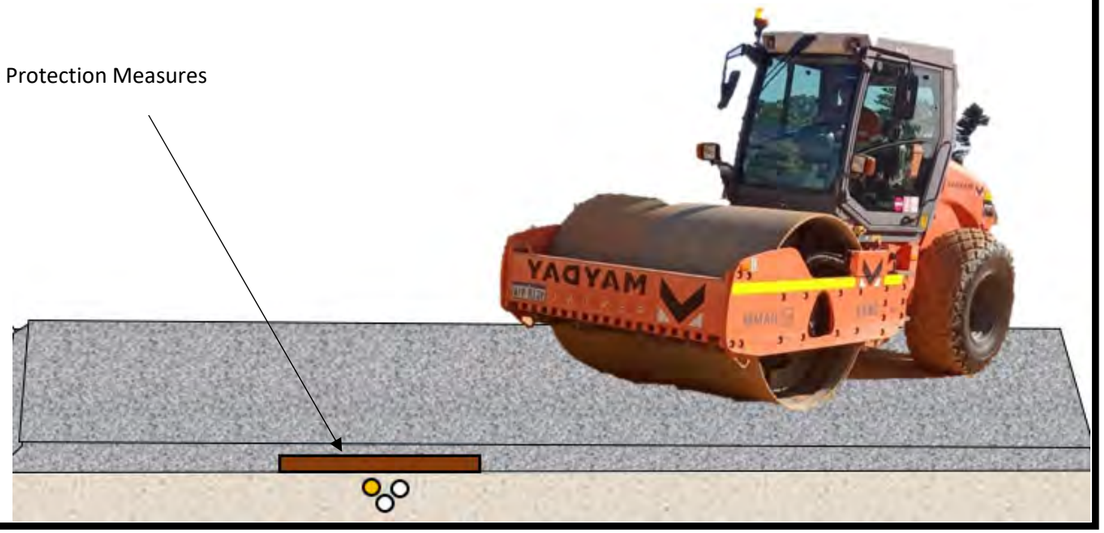
- Crane pad shall be constructed to the extent required for cranage operations within the work area. Crane overlay to be checked prior to set-out of pad zone & considering pad edge operating distance restrictions.
- Extent of pad shall be minimum of 23m wide from the closest pile location.



Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.

Service Protection Measures



ARMADALE ROAD POSSESSION WORKS – Piling / Precast Install (Stage 3)
(Completion of Early works Precast / Possession Stage Piling Works)

Construction Staging – Concept
Aston Williams

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Power Line (Overhead)
-	Temporary Fencing	-	Existing PTA boundary fence

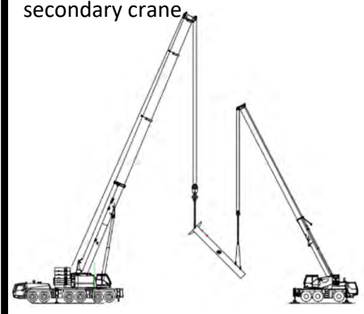
GATE 4

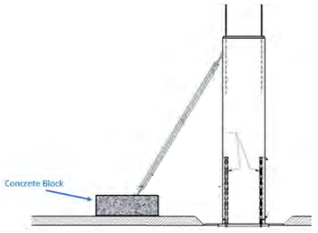
1. 2. 3. 4. 5.

Abt 01 | Pier 01 | Pier 02 | Pier 03 | Pier 04 | Pier 05 | Pier 06

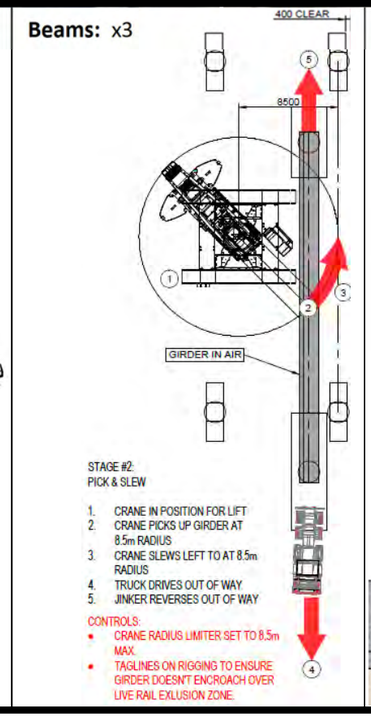
Refer to Sketch – Armadale Stage 1 Lane Diversion

Column /Headstock: x3 each
- Column rotations utilizing secondary crane





Beams: x3



Piling Works: x5 Piles
- Bore / Install Reo Cage / Concrete Pour

Piling / Precast Install:

NOTE: Temporary Closure of pedestrian pathway North side of Armadale road required to complete Pile 1 (Pier 07)

Stage A :
- Piling Plant / Equipment set-up and mobilization (Shift 1 – 3)
- Precast column Installation Pier 02 / Pier 01 / Pier Abt 01 (Shift 1)
- Commence grouting / concreting of columns immediately (Shift 1 / Shift 2)
- Commence piling of Pile Location 1. (Pier 07) - Shift 4 – 5

Stage B :
- Confirm column strength is acceptable for headstock installation (Shift 5)
- Precast Headstock Installation Pier 02 / Pier 01 / Pier Abt 01 (Shift 5)
- Commence concrete connection detail of headstocks immediate (Shift 5 / Shift 6)
- Commence piling of Pile Location 2. (Pier 06) - Shift 5 – 6
- Commence piling of Pile Location 3. (Pier 05) - Shift 6 – 7
- Commence piling of Pile Location 4. (Pier 04) - Shift 7 – 8
- Confirm headstocks connection strength has been achieved (Shift 8).

Stage C :
- Install x3 precast beams – (BN01-W = 122.7T, BN02-W = 115.6T, BN03-W = 132.1T) (Shit 8/9)

ARMADALE ROAD POSSESSION WORKS – Piling / Precast Install (Stage 4)
(Commencement of Possession Precast Install / Possession Stage Piling Works)

Construction Staging – Concept
Aston Williams

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Power Line (Overhead)
-	Temporary Fencing	-	Existing PTA boundary fence

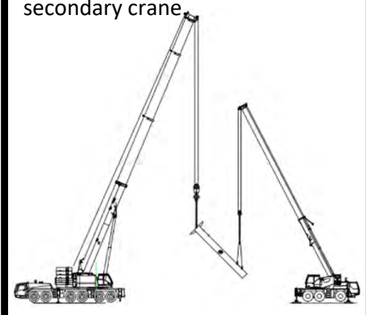
GATE 4

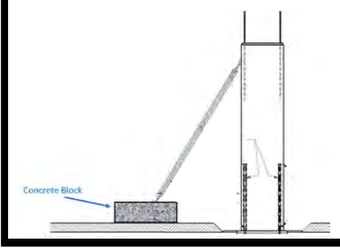
6.
7.
8.
23.07m
15.34m

Abt 01
Pier 01
Pier 02
Pier 03
Pier 04
Pier 05
Pier 06

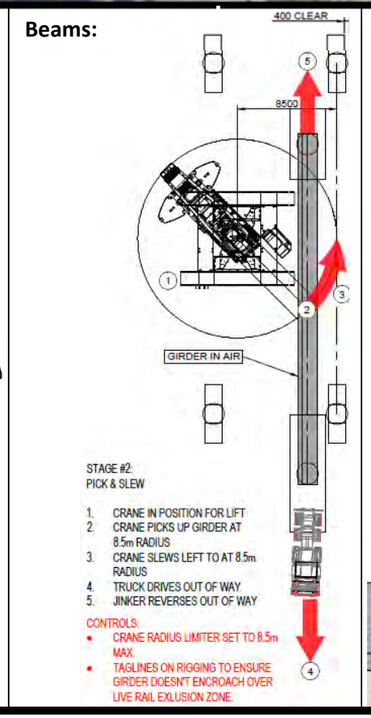
Refer to Sketch – Armadale Stage 1 Lane Diversion

Column /Headstock: x5 each
- Column rotations utilizing secondary crane





Beams:



Piling Works: x3 Piles
- Bore / Install Reo Cage / Concrete Pour

NOTE: Temporary Closure of pedestrian pathway North side of Armadale road required x2 Events (Column & Headstock Installs)

Stage D :
- Piling Plant / Equipment to move and set up at North end of site (Shift 9/10)
- Precast column Installation Pier 07 / Pier 06 / Pier 05 (Shift 10)
- Commence grouting / concreting of columns immediately (Shift 10/11)
- Commence piling of Pile Location 8. (Abt 01) - Shift 10/11)
- Precast column Installation Pier 04 / Pier 03 (Shift 11)
- Commence grouting / concreting of columns immediately (Shift 11/12)
- Commence piling of Pile Location 7. (Pier 01) - Shift 11-12

Stage E :
- Confirm column strength is acceptable for headstock installation (Shift 12)
- Precast Headstock Installation Pier 07 / Pier 06 / Pier (Shift 12)
- Commence concrete connection detail of headstocks immediate (Shift 12 /13)
- Commence piling of Pile Location 6. (Pier 02) - Shift 12/13
- Confirm column strength is acceptable for headstock installation (Shift 13)
- Precast Headstock Installation Pier 05 / Pier 04 / Pier (Shift 13)
- Commence concrete connection detail of headstocks immediate (Shift 13 /14)
- Confirm column strength is acceptable for headstock installation (Shift 14)
- Precast Headstock Installation Pier 03 (Shift 14)
- Commence concrete connection detail of headstocks immediate (Shift 14 /15)
- Commence demobilisation of all piling equipment from this location (Shift 13-15)

ARMADALE ROAD POSSESSION WORKS – Precast Install (Stage 5)

(Completion of Precast Installation)

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Power Line (Overhead)
-	Temporary Fencing	-	Existing PTA boundary fence

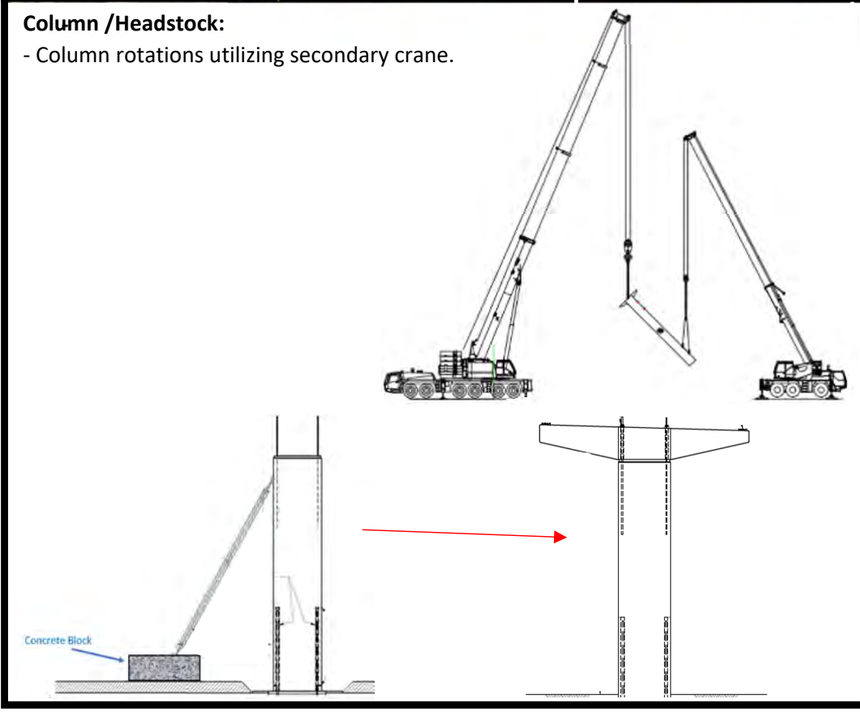
GATE 4

Abt 01 | Pier 01 | Pier 02 | Pier 03 | Pier 04 | Pier 05 | Pier 06

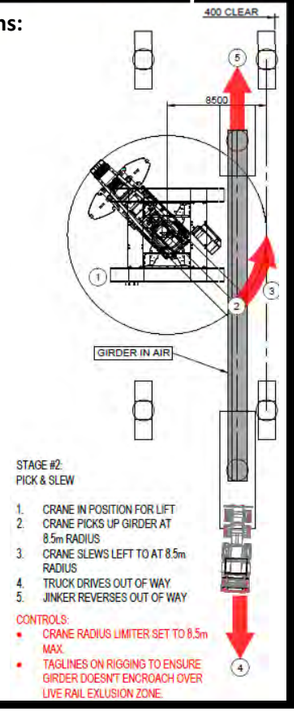
Refer to Sketch – Armadale Stage 1 Lane Diversion

Column /Headstock:

- Column rotations utilizing secondary crane.



Beams:



NOTE: Temporary Closure of pedestrian pathway North side of Armadale road required x1 Event (Beam BN07-E Install)

Stage F :

- Confirm piling strength has been achieved to allow for precast installation
- Precast column Installation Abt 01 / Pier 01 / Pier 02 (Shift 15)
- Confirm headstock connections have achieved strength (Shift 16)
- Install Beams Bay 07 / 06 (Shift 16) – (**BN07-E** = 133.5 T)
- Confirm headstock connections have achieved strength (Shift 17)
- Install Beams Bay 06 / 05 (Shift 17) – (**BN06-E** = 133.5 T)

Stage G :

- Confirm column strength is acceptable for headstock installation (Shift 18)
- Precast Headstock Installation Abt 01 / Pier 01 / Pier 02 (Shift 18)
- Commence concrete connection detail of headstocks immediate (Shift 18 /19)
- Confirm headstock connections have achieved strength (Shift 19)
- Install Beams Bay 05 / 04 (Shift 19) – (**BN05-E** = 117 T)
- Confirm headstock connections have achieved strength (Shift 20)
- Install Beams Bay 04 / 03 (Shift 20) – (**BN04-E** = 133.5T)
- Confirm headstock connections have achieved strength (Shift 21)
- Install Beams Bay 03 / 02 (Shift 21) – (**BN03-E** = 133.5T)
- Confirm headstock connections have achieved strength (Shift 22)
- Install Beams Bay 02 / 01 (Shift 22) – (**BN02-E** = 117T)
- Confirm headstock connections have achieved strength (Shift 23)
- Install Beams Bay 01 /Abt 01 (Shift 23) – (**BN01-E** = 125T)

ARMADALE ROAD POSSESSION WORKS – Precast Install (Stage 6)

(Completion of Precast Installation)

Aston Williams

Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Power Line (Overhead)
-	Temporary Fencing	-	Existing PTA boundary fence

GATE 4

Abt 01 | Pier 01 | Pier 02 | Pier 03 | Pier 04 | Pier 05 | Pier 06

Refer to Sketch – Armadale Stage 1 Lane Diversion

Precast Installation:

Installation of x77 precast planks

- Plank Span 01
- Plank Span 02
- Plank Span 04
- Plank Span 05
- Plank Span 06
- Plank Span 07

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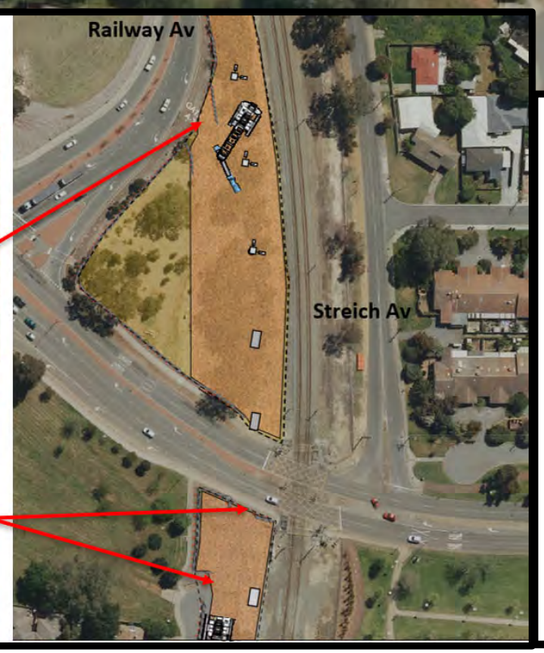
ARMADALE ROAD POSSESSION WORKS - Armadale Road
(Pre-possession Overview)

MetCONNX

Gate A-3 : - Railway Ave Southbound / Left Slip Lane

Gate A-4 / A-5 : - Armadale Road / Aragon Cr



- Armadale Road (West Bound) = No Impact
- Armadale Road (East Bound) = No Impact
- Pedestrian Path (South) = Minor interaction
  - Site access Gate A-4 shall interact with the southern pedestrian path. Site personnel shall give way to pedestrians upon entry / exit from site.
- Pedestrian Path (North) = Staged Closure
  - Temporary closure of the pedestrian pathway in this location required during specific piling & precast install activities. South side pedestrian path shall remain unobstructed and will act as alternative route during these periods of work.

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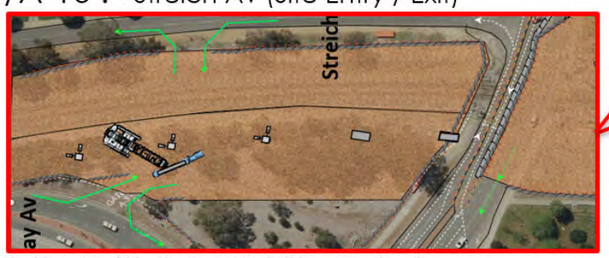
ARMADALE ROAD POSSESSION WORKS - Armadale Road
(Possession Overview)

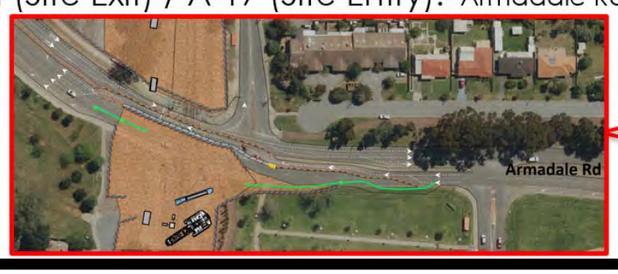
MetCONNX

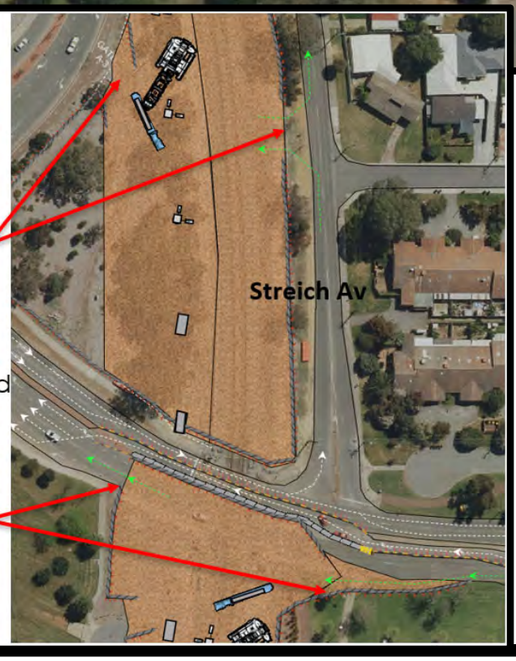
Note:
Road diversion is currently depicted as concept only. Final diversion details shall be captured under a Traffic Management Plan document and the construction works in this location shall take place under several staging's.

Gate A-3 /A-16 : - Streich Av (Site Entry / Exit)

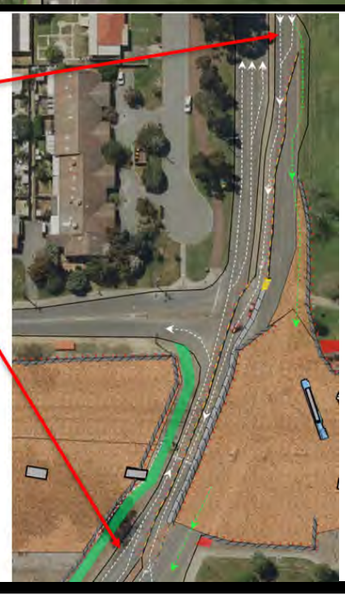


Gate A-4 (Site Exit) / A-17 (Site Entry):- Armadale Rd





- Armadale Road (West Bound) = Traffic Adjustment
  - Merger of dual lane into single lane
  - Speed reduction from 70km/hr to 60km/hr
- Armadale Road (East Bound) = Traffic Adjustment
  - Merger of dual lane into single lane
  - Speed reduction from 70km/hr to 60km/hr
- Pedestrian Path (South) = Path Closure
- - Pedestrian path adjustment falls within project scope requiring the long term closure of the southern pedestrian path.
- Pedestrian Path (North) = No Impact



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ARAGON COURT EARLY WORKS – Tree Removal (Stage 1)
(Temporary Fencing / Service Management / Traffic Management)

MetCONNX

Stage 1 – Aragon Court Overview Plan:

Tree Removal – Stage 1

Fencing / Traffic Management:

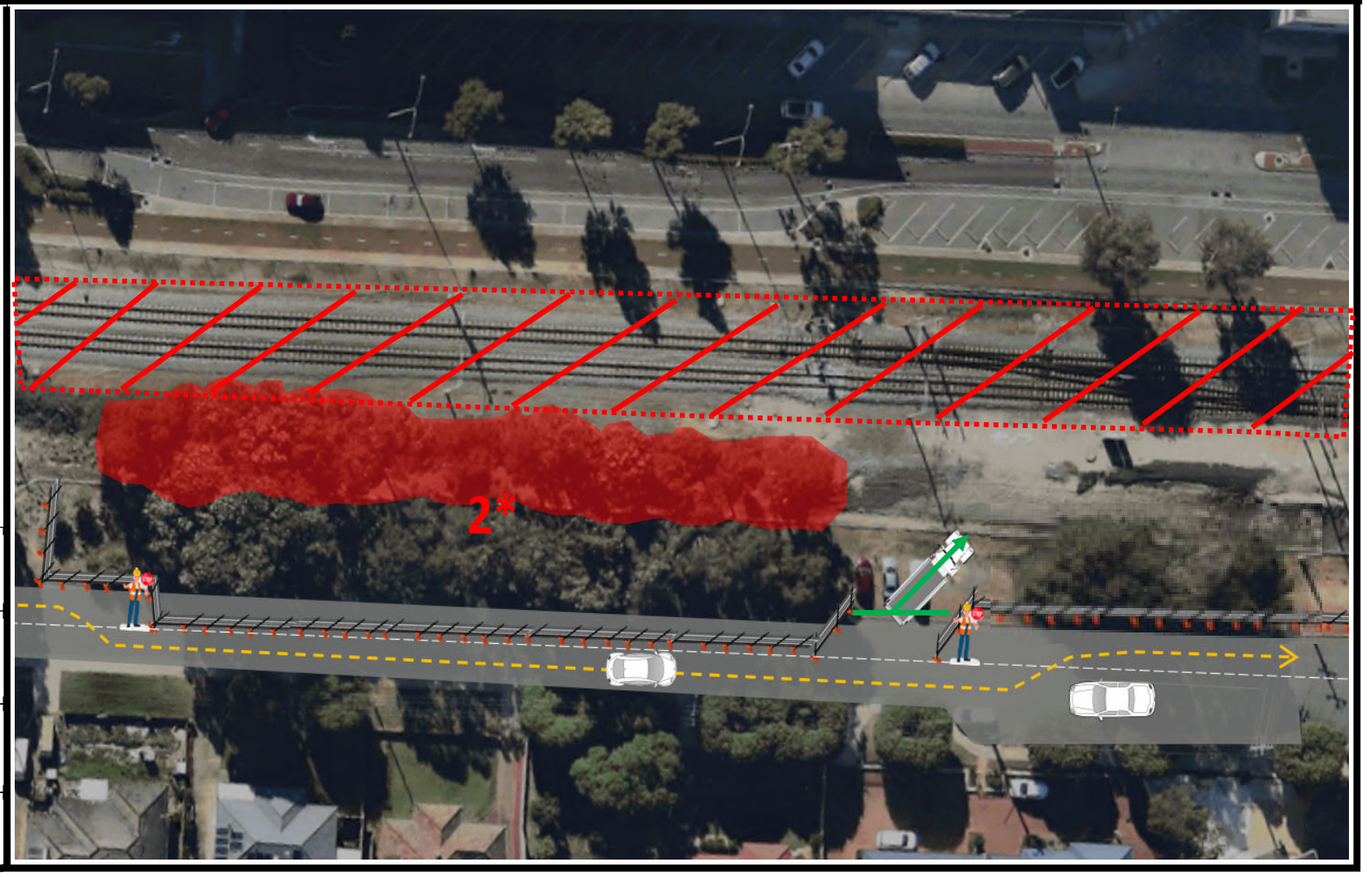
- Temporary fencing shall be locally erected around the tree cluster area – taking localized possession of the eastern side of Argon court during the works. Fencing shall provide a safe work zone, separating public from the tree removal activity.
- Traffic control personnel shall be positioned at either end of the fenced protrusion during high traffic periods to manage the flow of local traffic in and out of Argon Court.

Services:

- Known electrical power line adjacent to the work zone shall be managed in accordance with construction plan. Where applicable tiger tails / identification shall be put in place and separation of plant operations established)

Legend:

- **Tree Removal Zone**	- **Traffic management**
- **Work Zone Entry Point**	- **Overhead Service Location**
- **Adjusted Traffic Path**	- **Local Traffic**
- **Temporary Fencing**	- **PTA Rail Danger Zone**



Construction Staging – Concept
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ARAGON COURT EARLY WORKS – Tree Removal (Stage 2)
(Temporary Fencing / Service Management / Traffic Management)

MetCONNX

Stage 2 – Aragon Court Overview Plan:

Tree Removal – Stage 2

Fencing / Traffic Management:

- Temporary fencing shall be locally erected around the tree cluster area – taking localized possession of the eastern side of Argon court during the works. Fencing shall provide a safe work zone, separating public from the tree removal activity.
- Traffic control personnel shall be positioned at either end of the fenced protrusion during high traffic periods to manage the flow of local traffic in and out of Argon Court.

Heritage Tree Protection:

- Tree noted a *P* has been identified as a heritage tree which shall be protected during the construction works. Tree removal team shall be briefed on its importance and water barriers or similar shall be set up around it to protect it from adjacent works.

Legend:

- **Tree Removal Zone**	- **Traffic management**
- **Protected Tree** *P*	- **Overhead Service Location**
- **Adjusted Traffic Path**	- **Local Traffic**
- **Temporary Fencing**	- **PTA Rail Danger Zone**

Construction Staging – Concept
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ARAGON COURT EARLY WORKS – Tree Removal (Stage 3)
(Temporary Fencing / Service Management / Traffic Management)

MetCONNX

Stage 3 – Aragon Court Overview Plan:

Tree Removal – Stage 3

Fencing / Traffic Management:

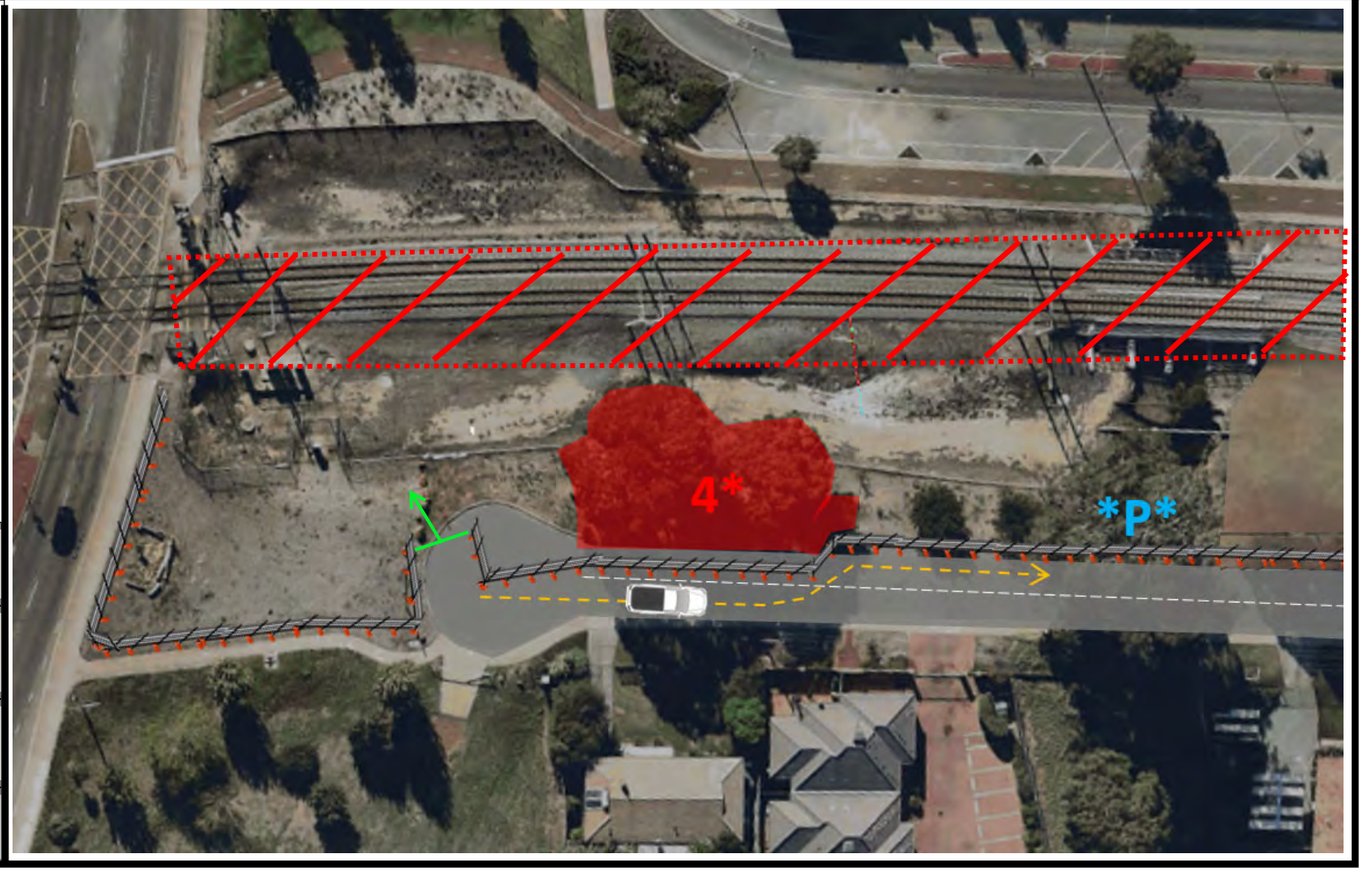
- Temporary fencing shall be locally erected around the tree cluster area – taking localized possession of the eastern side of Argon court during the works. Fencing shall provide a safe work zone, separating public from the tree removal activity.
- Traffic control personnel shall be positioned at either end of the fenced protrusion during high traffic periods to manage the flow of local traffic in and out of Argon Court.

Heritage Tree Protection:

- Tree noted a *P* has been identified as a heritage tree which shall be protected during the construction works. Tree removal team shall be briefed on its importance and water barriers or similar shall be set up around it to protect it from adjacent works.

Legend:

- **Tree Removal Zone**	- **Traffic management**
- **Protected Tree** *P*	- **Site Entry Point**
- **Adjusted Traffic Path**	- **Local Traffic**
- **Temporary Fencing**	- **PTA Rail Danger Zone**



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ARAGON COURT EARLY WORKS – Piling / Crane Pad Construction (Stage 4)
(Crane Pad Construction)

MetCONNX

Stage 4 – Aragon Court Overview Plan:

LEGEND:

- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Local Traffic	
- Temporary Fencing		- Overhead Electrical	

Mobilization of Plant and Materials:

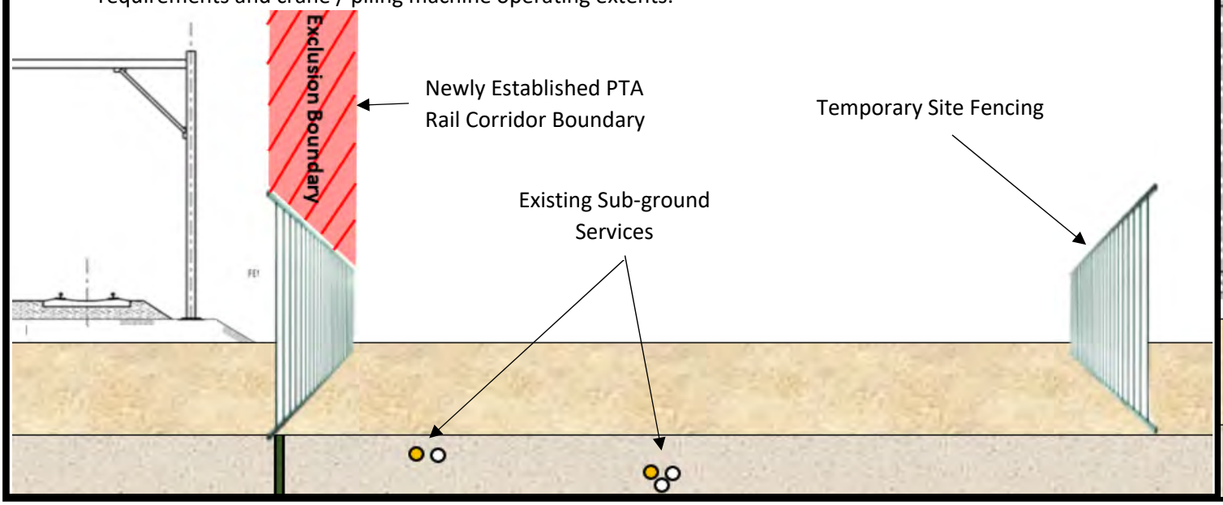
- Aragon Court entry point is the location of x2 powerlines crossing road. All plant / deliveries to be checked and confirmed as under the required head height for entry/exit of the Aragon court area prior to mobilization.

Services Relocation / Protection:

- Services team to identify all PTA services / service pits which run within the planned pad construction zone.
- Services to either be relocated / decommissioned or protected via temporary works prior to pad construction.

PTA Boundary Establishment

- Tack side fence is to be installed 3m from the rail or as close as possible to allow for construction area requirements and crane / piling machine operating extents.

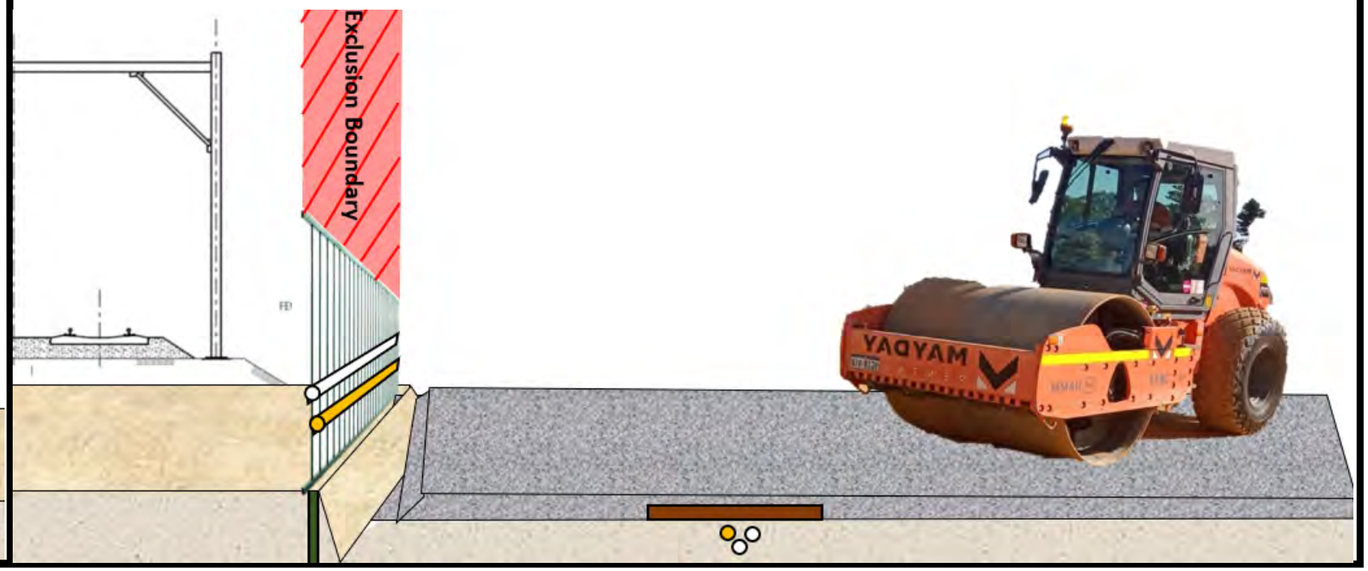


Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.

NOTE:

- Zones indicated by *** are flagged as adjacent to existing culvert / waterway. Pad construction in this zone needs to consider this specific zone and if required – additional temporary works or controls put in place for operations in this area.



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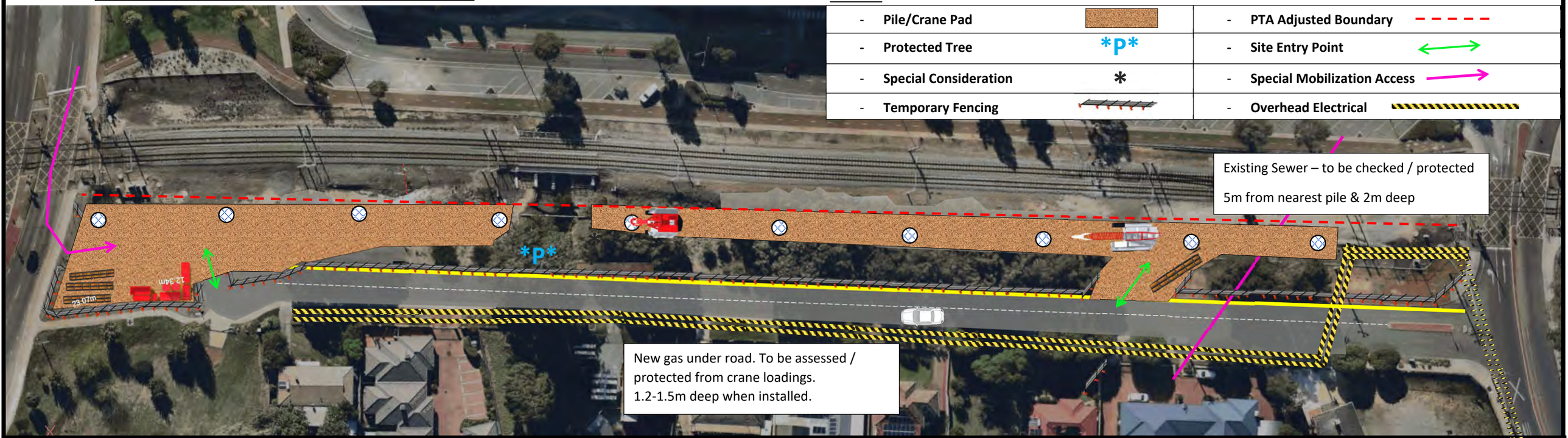
ARAGON COURT EARLY WORKS – Piling Works (Stage 5) (Piling)

MetCONNX

Stage 5 – Aragon Court Overview Plan:

LEGEND:

- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Special Mobilization Access	
- Temporary Fencing		- Overhead Electrical	

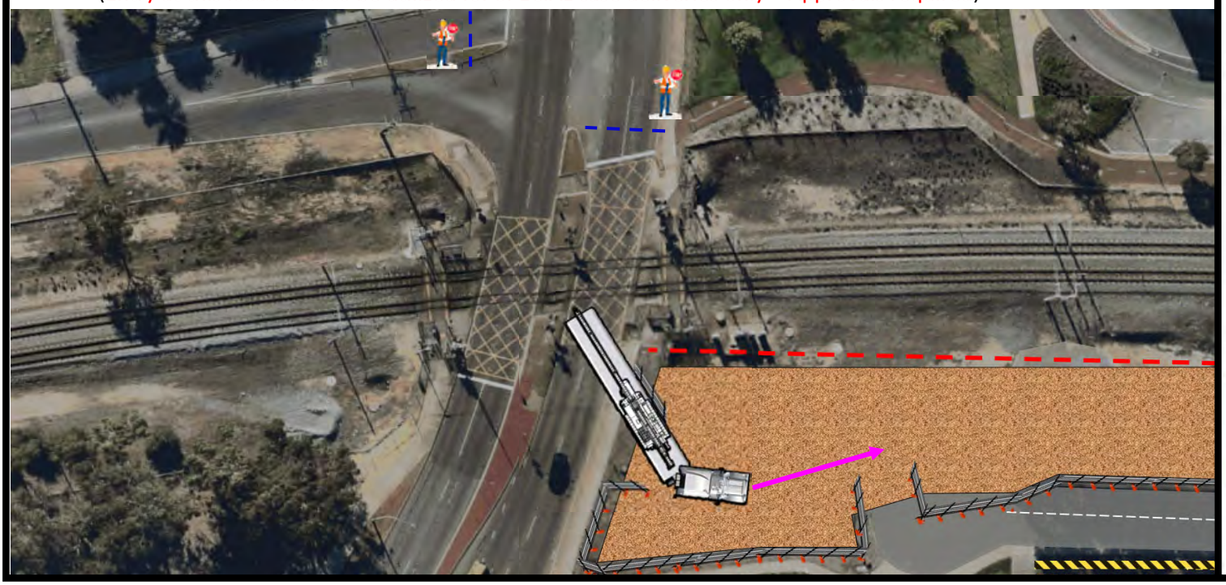


Float of Piling Rig / Crane & Equipment:

*** Due to existing overhead powerlines at North end of Aragon Court – It is likely that a temporary access gate will need to be implemented off of Armadale Road for delivery of oversize/over height piling rig.**

Delivery Restrictions: (CONCEPT ONLY - Route to be assessed * Rail Crossing coordination required, PO to be present)

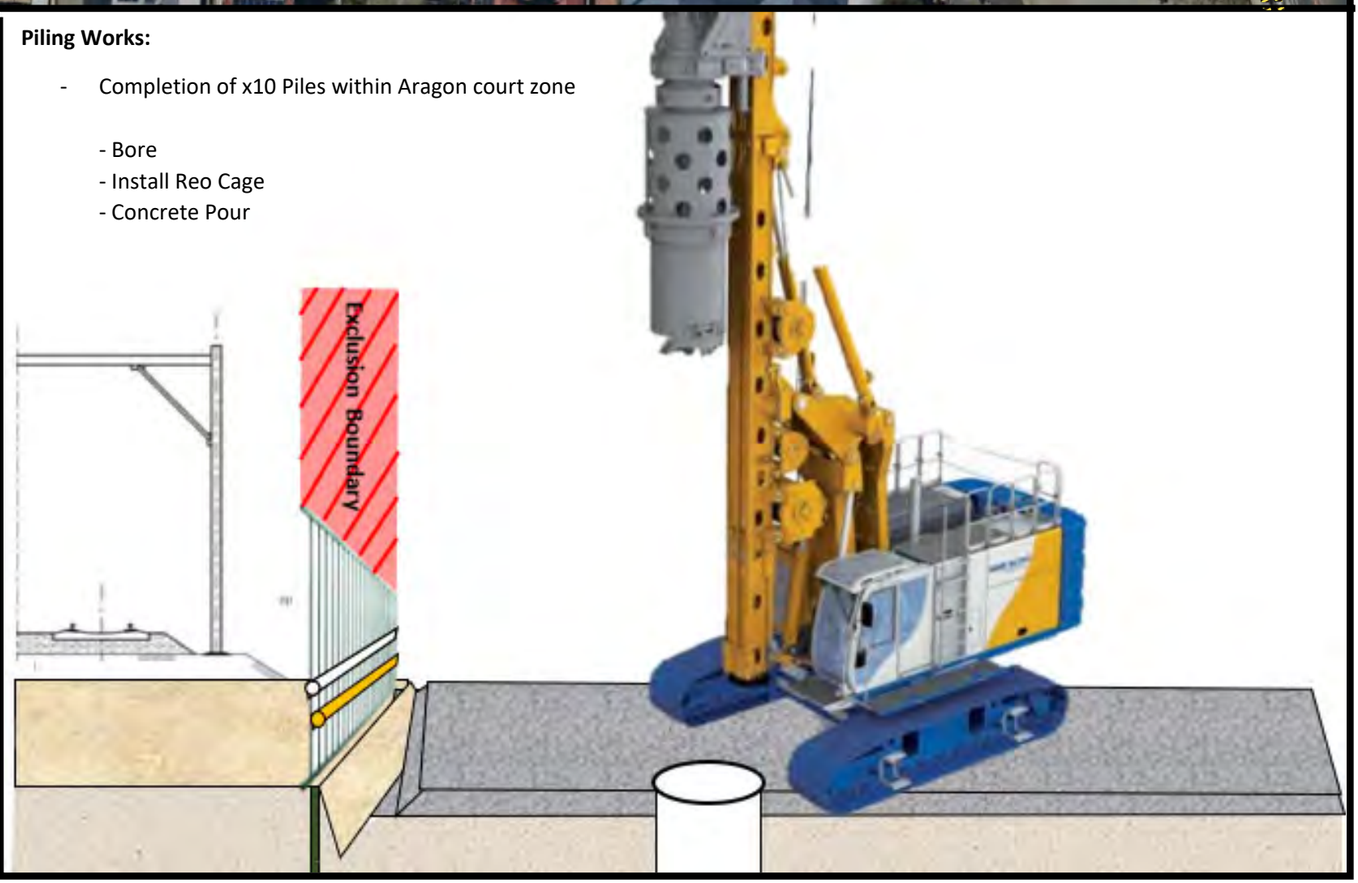
- Armadale road is identified as a high traffic zone. Delivery must be conducted at night under a traffic management plan. Local council / authorities to be contacted and informed.
  (Entry at this location is to be utilized for SPECIAL case deliveries only – Approvals required)



Piling Works:

- Completion of x10 Piles within Aragon court zone

  - Bore
  - Install Reo Cage
  - Concrete Pour



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ARAGON COURT POSSESSION WORKS – Preparation Works (Stage 6)
(Site Boundary / Tree Removal / Service Relocation)

Stage 6 – Aragon Court Overview Plan:

LEGEND:

-	**Pile/Crane Pad**	-	**PTA Adjusted Boundary**
-	**Protected Tree** *p*	-	**Site Entry Point**
-	**Special Consideration** *	-	**Local Traffic**
-	**Temporary Fencing**	-	**Overhead Electrical**

Site Boundary Adjustment:

- Temporary possession of Carparks (All Western carpark bays along shopping centre complex boundary) (Community team to engage relevant owner/authority to coordinate possession of zone)
- Pedestrian pathway North and South of ARAGON court are to be closed permanently
- Site fencing to be adjusted to encapsulate full work zone.
- Eastern site access gate to be established on Armadale Road
- Existing PTA fence to be removed to prevent clash with works.

Tree Removal:

- Trees identified as clashing with planned works to be removed

Service Works:

- Telstra relocation (Information required)
- Overhead powerline removal – Powerlines to be removed / adjusted along Aragon Court intersection.
- Decommissioning / Removal of all PTA rail assets within corridor

Notes:

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ARAGON COURT POSSESSION WORKS – Rail Demolition (Stage 7)
(Rail Demo / Services Works / Service Protections)

Stage 7 – Aragon Court Overview Plan:

LEGEND:

- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Local Traffic	
- Temporary Fencing		- Overhead Electrical	

Rail Demolition:

NOTE: Rail and Sleepers can be removed from bridge structure – but the bridge structure must remain

- Decommission / Remove all Rail Electrical / Coms Assets

- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

- Partial removal of pedestrian pathway is required within design. Either demolish entire pathway at this stage or crane pad will be built over it, requiring it to be exposed and demolished at a later stage.

Below Ground Service Activities:

- CIVLS / services team to complete any service relocations / modifications within this zone

- Any services which remain or are newly placed should have a service protection detail / plan incorporated within the temporary works design.

Geotechnical Testing :

- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

Notes:

- Extent of service works in this zone to be clarified.
- Bridge foundations to be checked to ensure they do not clash with pile location - as this would drive early demolition.

Known Service Activities
- **TELSTRA** relocation

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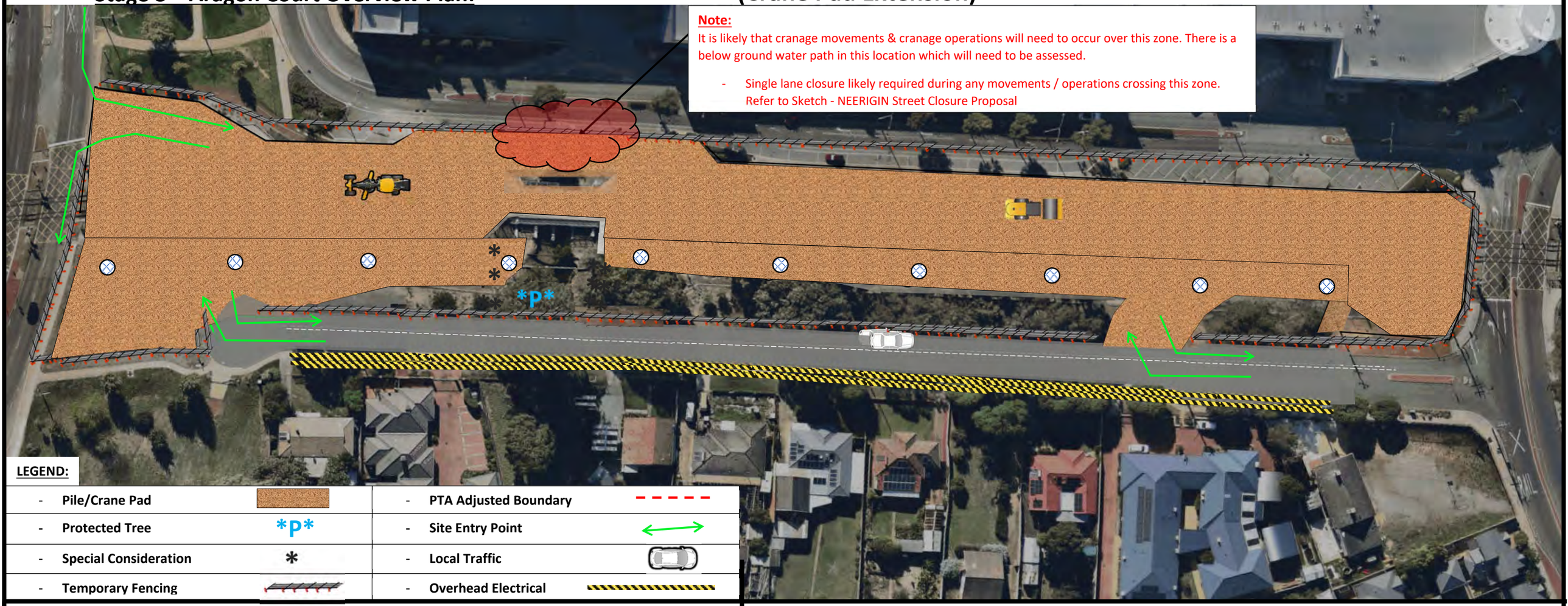
ARAGON COURT POSSESSION WORKS – Piling / Crane Pad Extension (Stage 8)

Stage 8 – Aragon Court Overview Plan:

(Crane Pad Extension)



Note:
It is likely that cranage movements & cranage operations will need to occur over this zone. There is a below ground water path in this location which will need to be assessed.

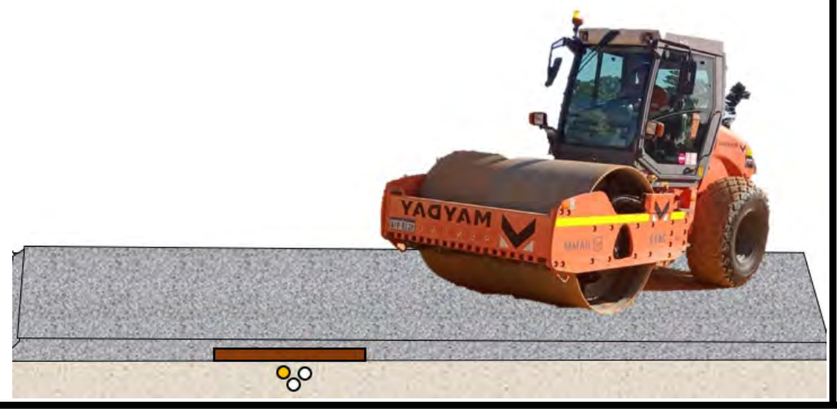
- Single lane closure likely required during any movements / operations crossing this zone. Refer to Sketch - NEERIGIN Street Closure Proposal

LEGEND:

-	**Pile/Crane Pad**	-	**PTA Adjusted Boundary**
-	**Protected Tree** *p*	-	**Site Entry Point**
-	**Special Consideration** *	-	**Local Traffic**
-	**Temporary Fencing**	-	**Overhead Electrical**

Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.
- Extent of pad size to be checked against crane footprint + boundary distance restrictions prior to finalization of pad set-out



Notes:

- With the existence of the bridge structure – consideration will need to be given into the crane movement path from South to North in this zone. Either the crane pad will need to be expanded into the car park zone at the bridge location to provide access route (Spatial check to be undertaken) or a crane movement plan across forest / Armadale roads should be considered for crane movements form adjacent zones.

Construction Staging – Concept
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ARAGON COURT POSSESSION WORKS – Piling / Western Beam Install (Stage 9)

Stage 9 – Aragon Court Overview Plan: (Commencement of Piling – North / Column Installation - South)

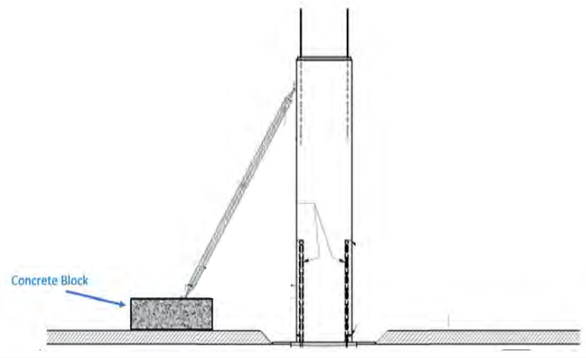
LEGEND:

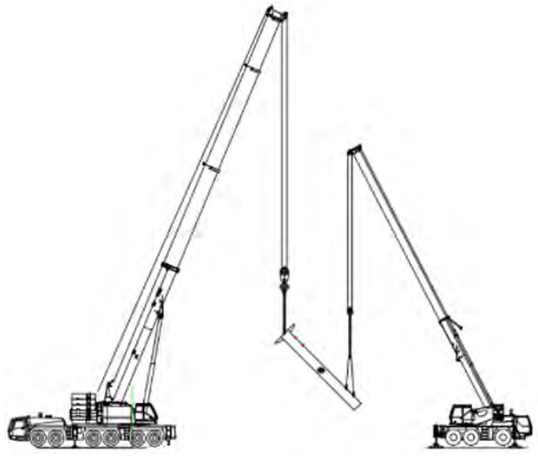
- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Local Traffic	
- Temporary Fencing		- Overhead Electrical	

Precast Installation:

Installation of x6 Columns -

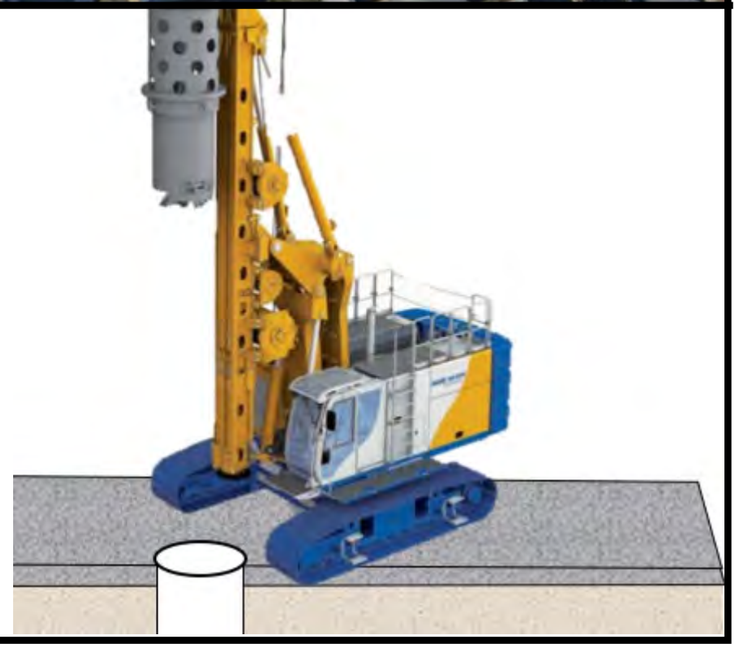
- Columns shall be lifted utilizing a secondary crane to top and tail rotate
- Propping of columns for temporary support
- Concrete / Grout pour permanent connections
- Test & confirm required loading strength achieved





Piling Works:

- Completion of x4 Piles within Aragon court zone
  - Bore
  - Install Reo Cage
  - Concrete Pour



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ARAGON COURT POSSESSION WORKS – Piling / Western Beam Install (Stage 10)

Stage 10 – Aragon Court Overview Plan: (Commencement of Piling – South / Column Installation - North)

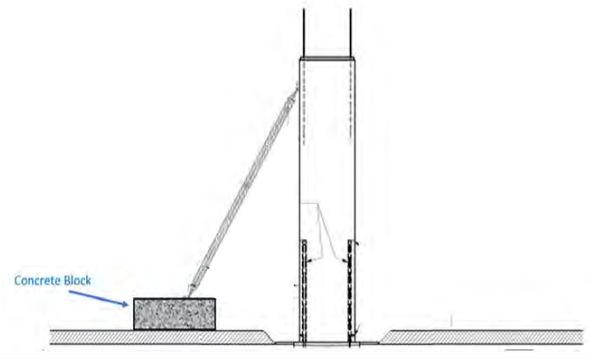
LEGEND:

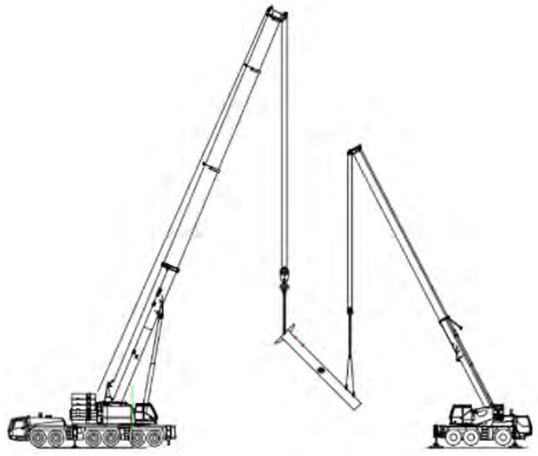
-	**Pile/Crane Pad**	-	**PTA Adjusted Boundary**
-	**Protected Tree** *p*	-	**Site Entry Point**
-	**Special Consideration** *	-	**Local Traffic**
-	**Temporary Fencing**	-	**Overhead Electrical**

Precast Installation:

Installation of x 4 Columns -

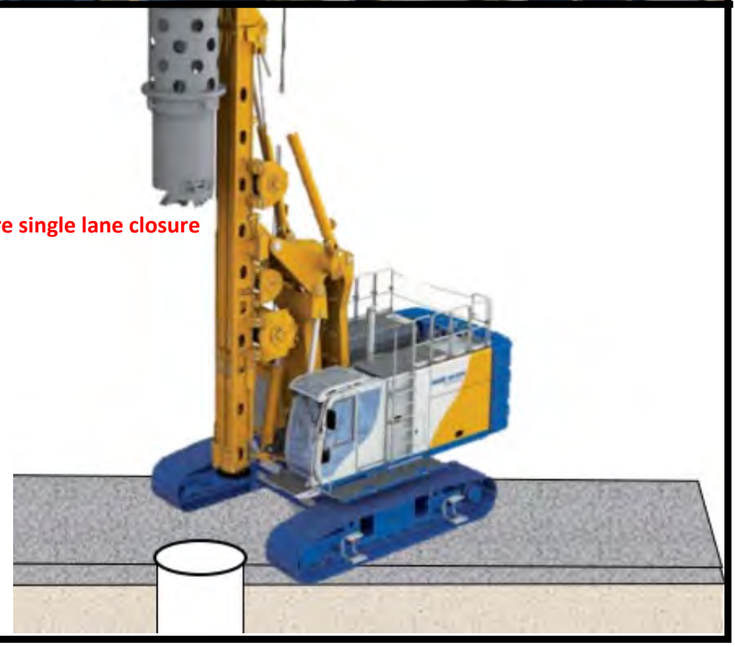
- Columns shall be lifted utilizing a secondary crane to top and tail rotate
- Propping of columns for temporary support
- Concrete / Grout pour permanent connections
- Test & confirm required loading strength achieved





Piling Works:

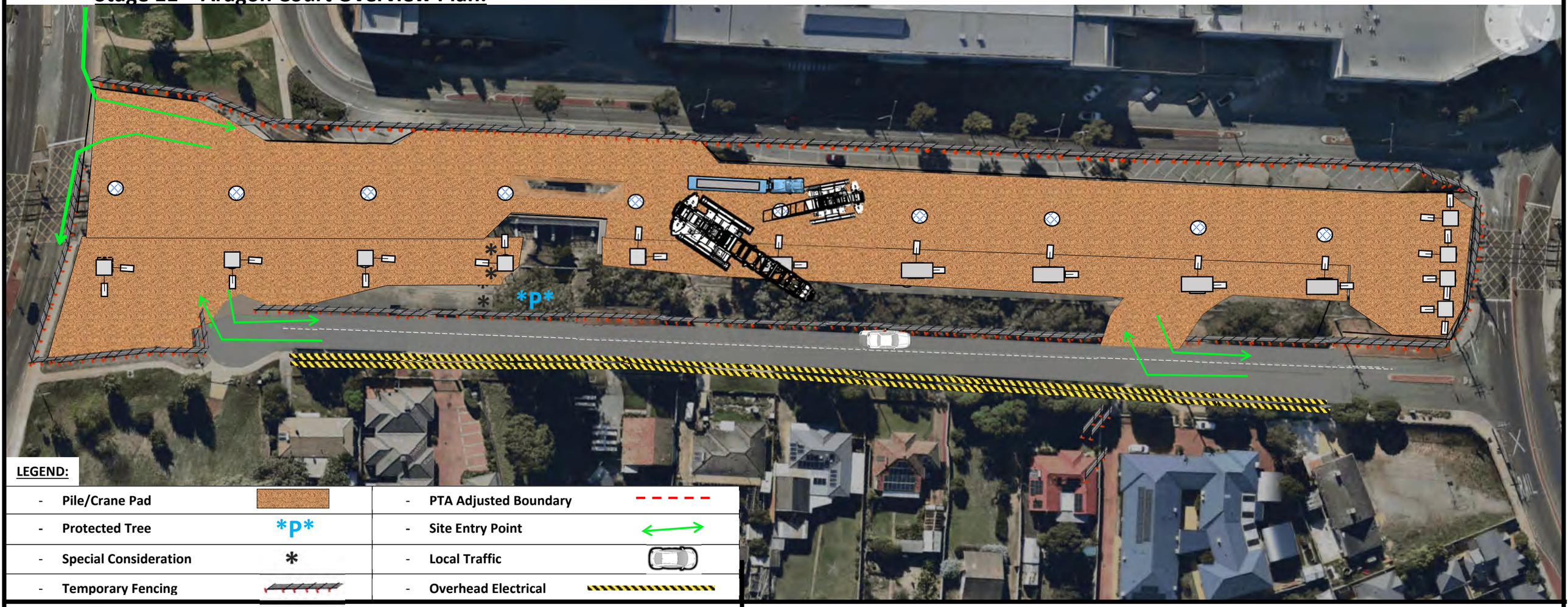
- Completion of x10 Piles within Aragon court zone
  - Bore
  - Install Reo Cage
  - Concrete Pour
- **NOTE * : x4 Piles adjacent to Forest Road may require single lane closure to maintain safe working distance from public.**



Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Precast Install South (Stage 11)
(Column & Headstock Install)

Stage 11 – Aragon Court Overview Plan:



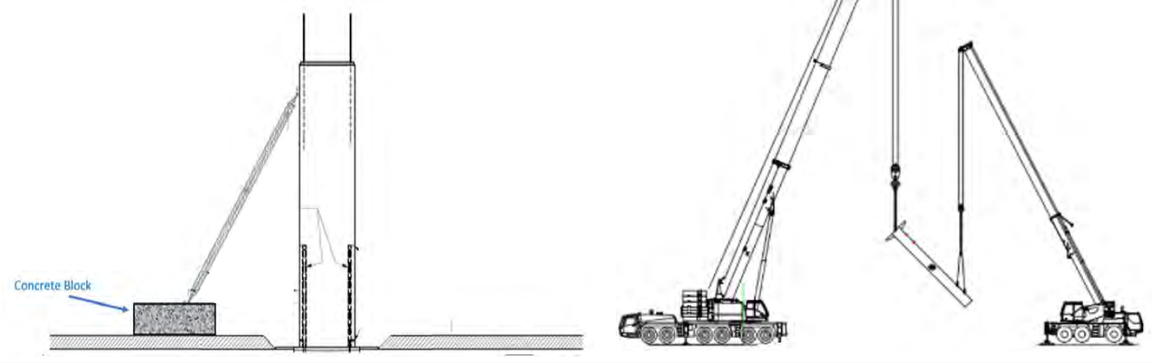
LEGEND:

-	**Pile/Crane Pad**	-	**PTA Adjusted Boundary**
-	**Protected Tree** *p*	-	**Site Entry Point**
-	**Special Consideration** *	-	**Local Traffic**
-	**Temporary Fencing**	-	**Overhead Electrical**

Precast Installation:

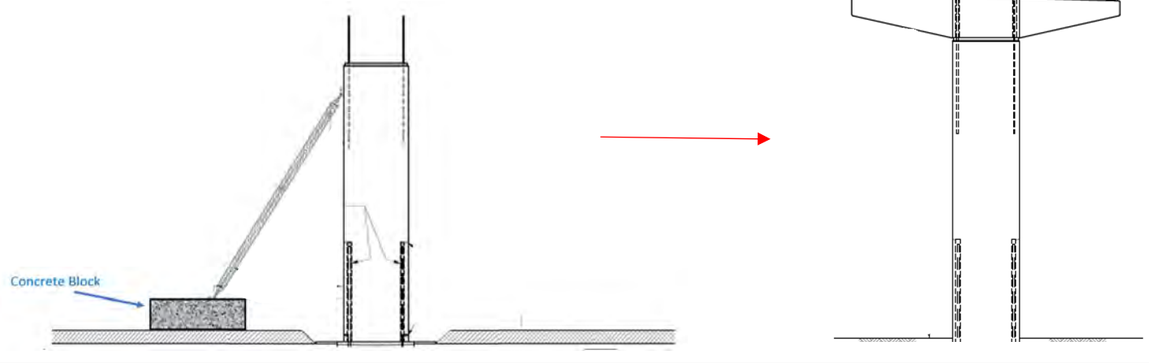
Installation of x 4 Columns -

- Columns shall be lifted utilizing a secondary crane to top and tail rotate
- Propping of columns for temporary support
- Concrete / Grout pour permanent connections
- Test & confirm required loading strength achieved



NOTE: Single Lane possession required for duration of x4 Column / headstock install works – Adjacent to Forest Road.

- Installation of x 6 Headstocks



Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Precast Install (Stage 12)
(Column & Headstock Install)

Stage 12 – Aragon Court Overview Plan:

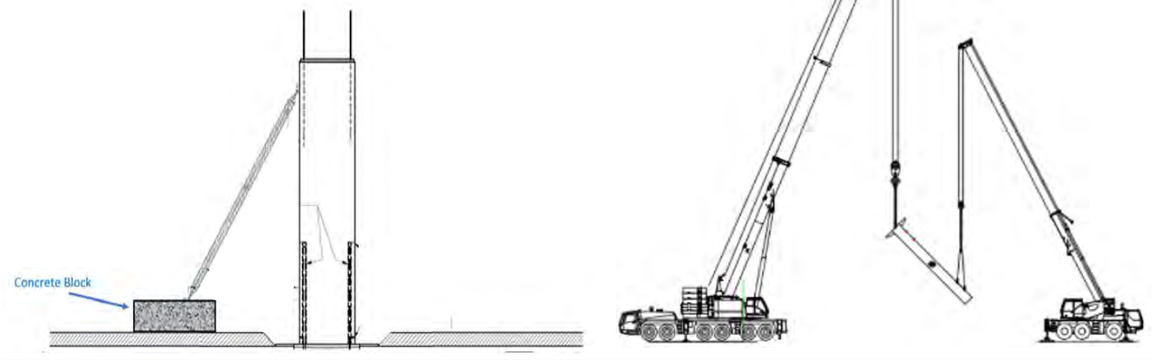
LEGEND:

-	**Pile/Crane Pad**	-	**PTA Adjusted Boundary**
-	**Protected Tree** *p*	-	**Site Entry Point**
-	**Special Consideration** *	-	**Local Traffic**
-	**Temporary Fencing**	-	**Overhead Electrical**

Precast Installation:

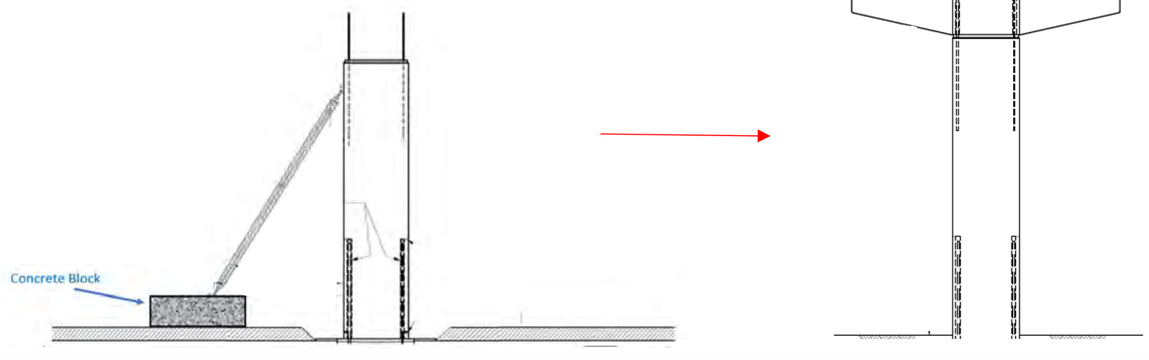
Installation of x 10 Columns -

- Columns shall be lifted utilizing a secondary crane to top and tail rotate
- Propping of columns for temporary support
- Concrete / Grout pour permanent connections
- Test & confirm required loading strength achieved



NOTE: Single Lane possession required for duration of x4 Column / headstock install works – Adjacent to Forest Road.

- Installation of x 18 Headstocks



Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Beam Installation (Stage 13)
(Precast Beam Delivery & Install)

Stage 13 – Aragon Court Overview Plan:

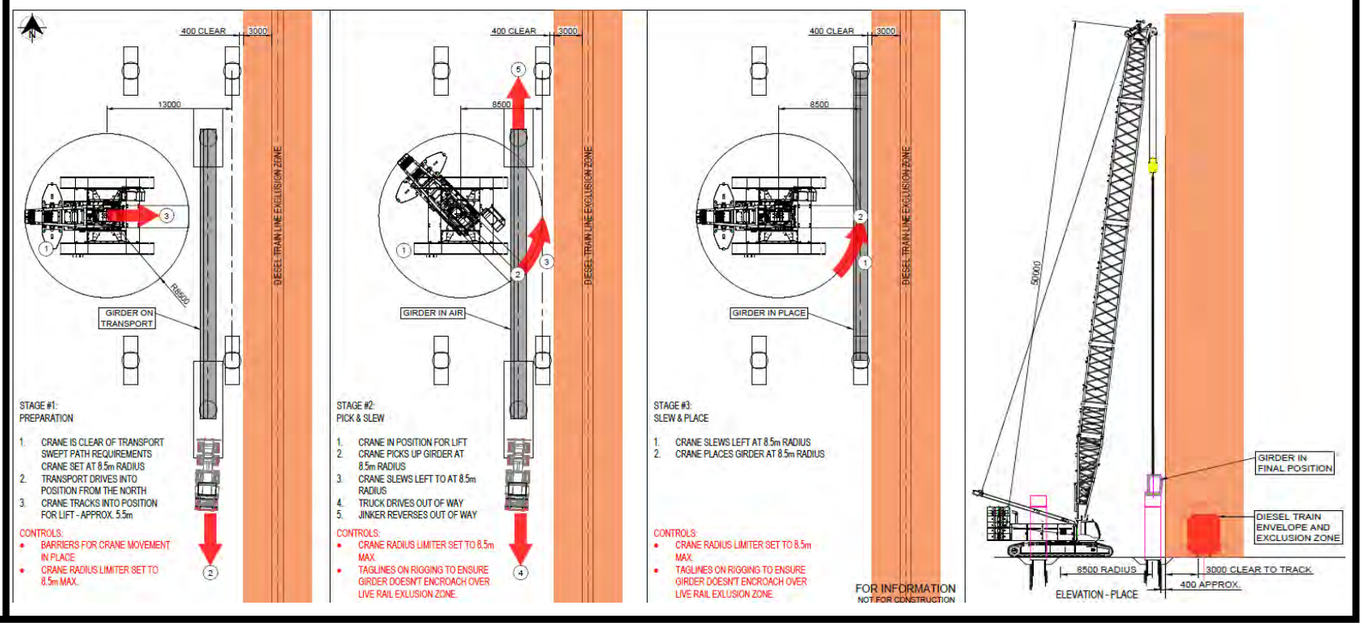
LEGEND:

-	**Pile/Crane Pad**	-	**PTA Adjusted Boundary**
-	**Protected Tree** *p*	-	**Site Entry Point**
-	**Special Consideration** *	-	**Local Traffic**
-	**Temporary Fencing**	-	**Overhead Electrical**

Precast Installation:

Installation of x4 precast beams

- BN09-W = 123.3T
- BN09-E = 125T
- BN10-W = 123.4T
- BN10-E = 125T



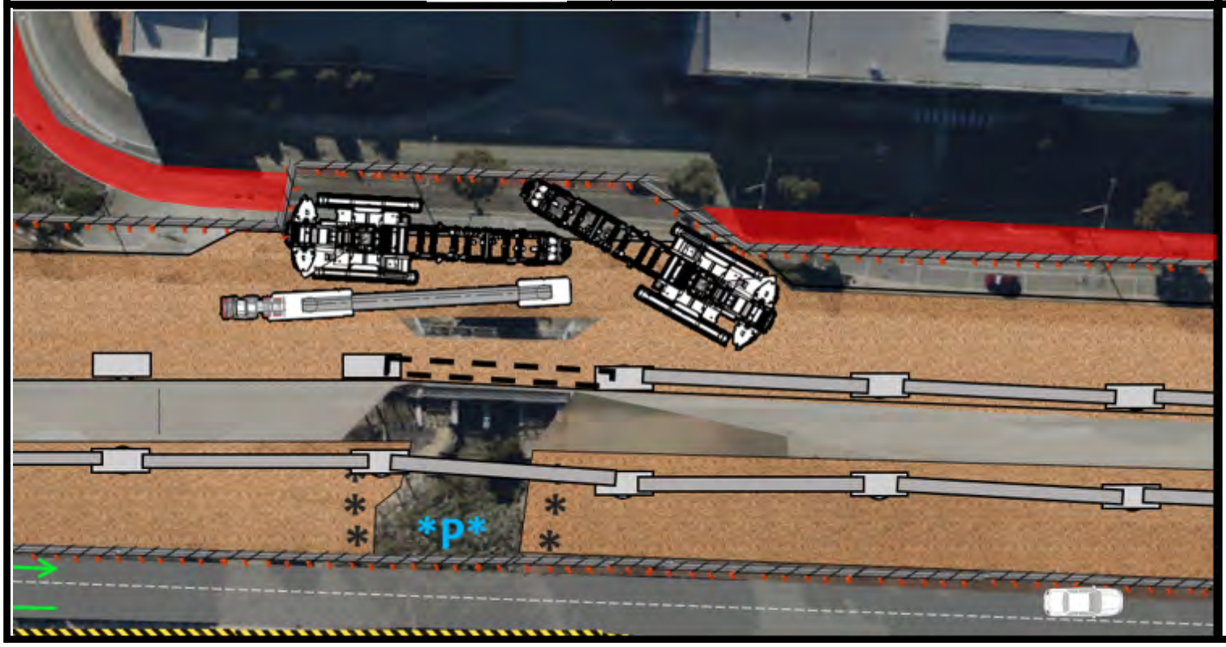
Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Beam Installation (Stage 14)
(Precast Beam Delivery & Install)

Stage 14 – Aragon Court Overview Plan:

LEGEND:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Special Consideration	-	Local Traffic
-	Temporary Fencing	-	Overhead Electrical



NOTE: Due to existence of ground drop-off into existing ravine. It is unlikely that a single crane will be able to complete this lifting operation from the increased distance. Therefore, this is likely a dual lift operation.

Road closure / Diversion will be required during this works.

Precast Installation:

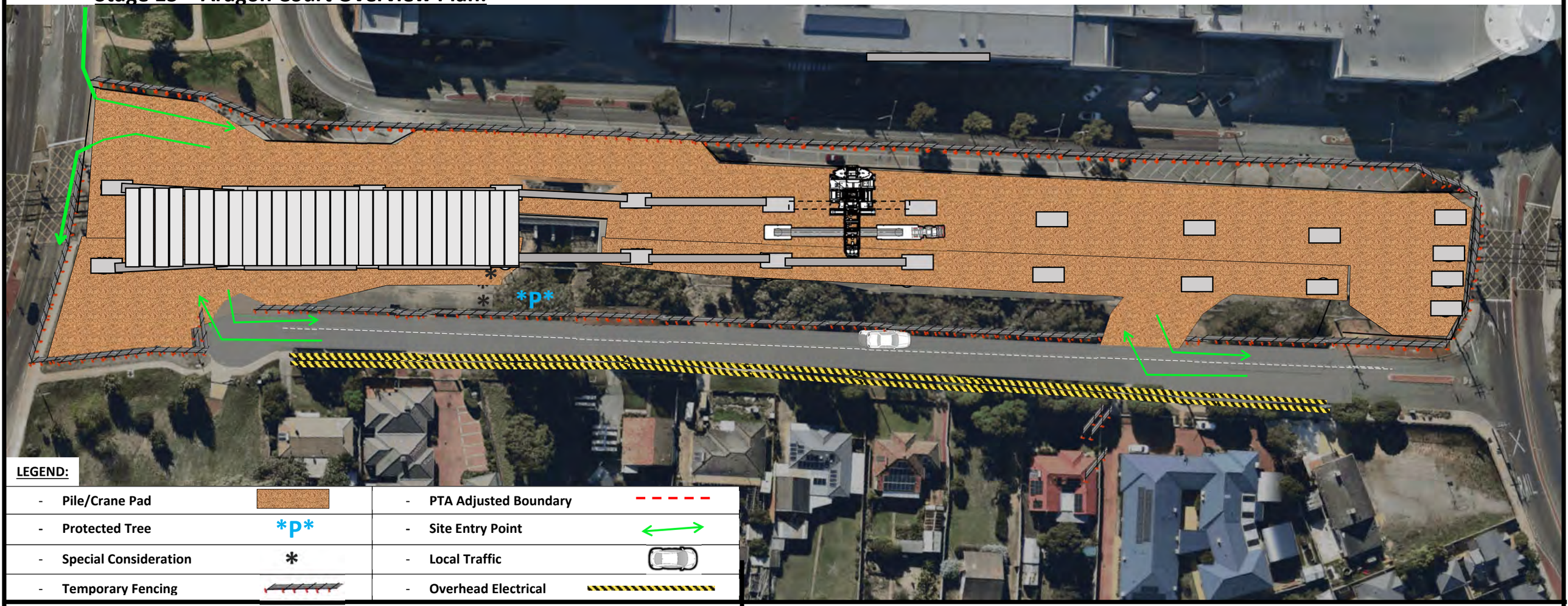
Installation of x1 precast beams – (BN12-W = 125T)

Installation of x1 precast beams – (BN12-E = 124.3T)

Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Beam Installation (Stage 15)
(Precast Beam & Plank Install)

Stage 15 – Aragon Court Overview Plan:



LEGEND:

- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Local Traffic	
- Temporary Fencing		- Overhead Electrical	

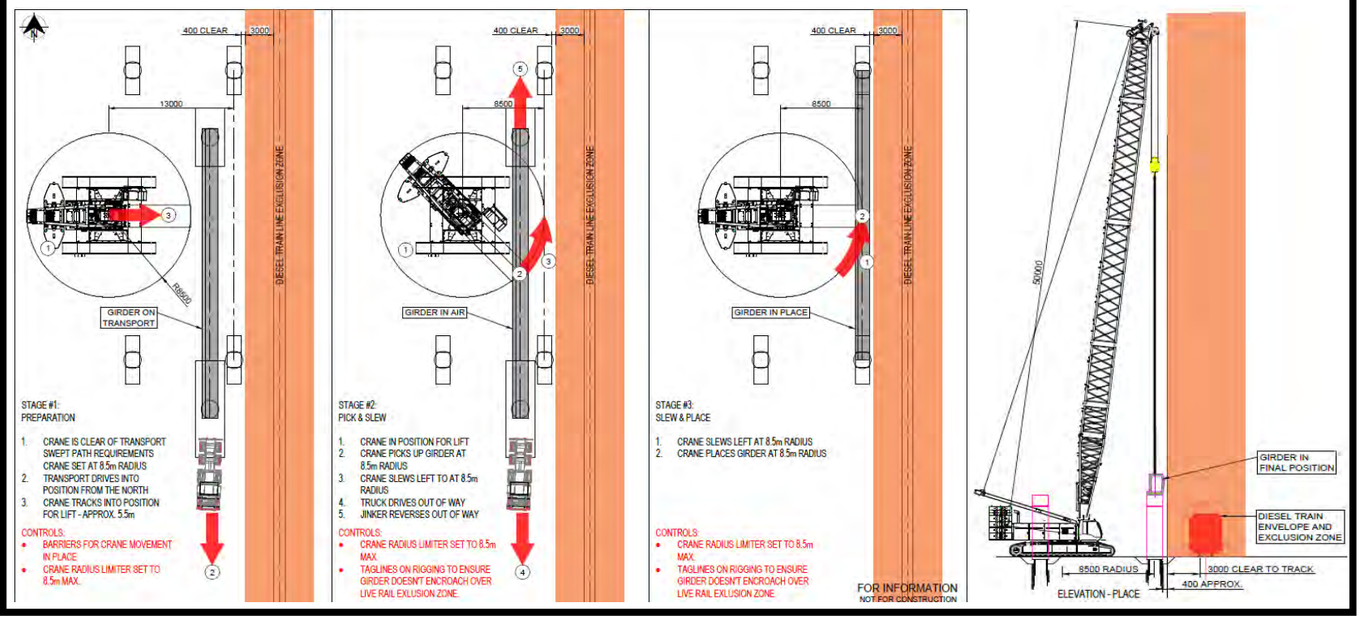
Precast Installation:

Installation of x30 precast planks

- Plank Span 09
- Plank Span 10
- Plank Span 11

Installation of x4 precast beams

- BN13-W = 123.4T
- BN13-E = 124.7T
- BN14-W = 107.2T
- BN14-E = 107.1T



Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Beam Installation (Stage 16)
(Precast Beam & Plank Install)

Stage 16 – Aragon Court Overview Plan:

LEGEND:

- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Local Traffic	
- Temporary Fencing		- Overhead Electrical	

Precast Installation:

Installation of x20 precast planks

– Plank Span 12

– Plank Span 13

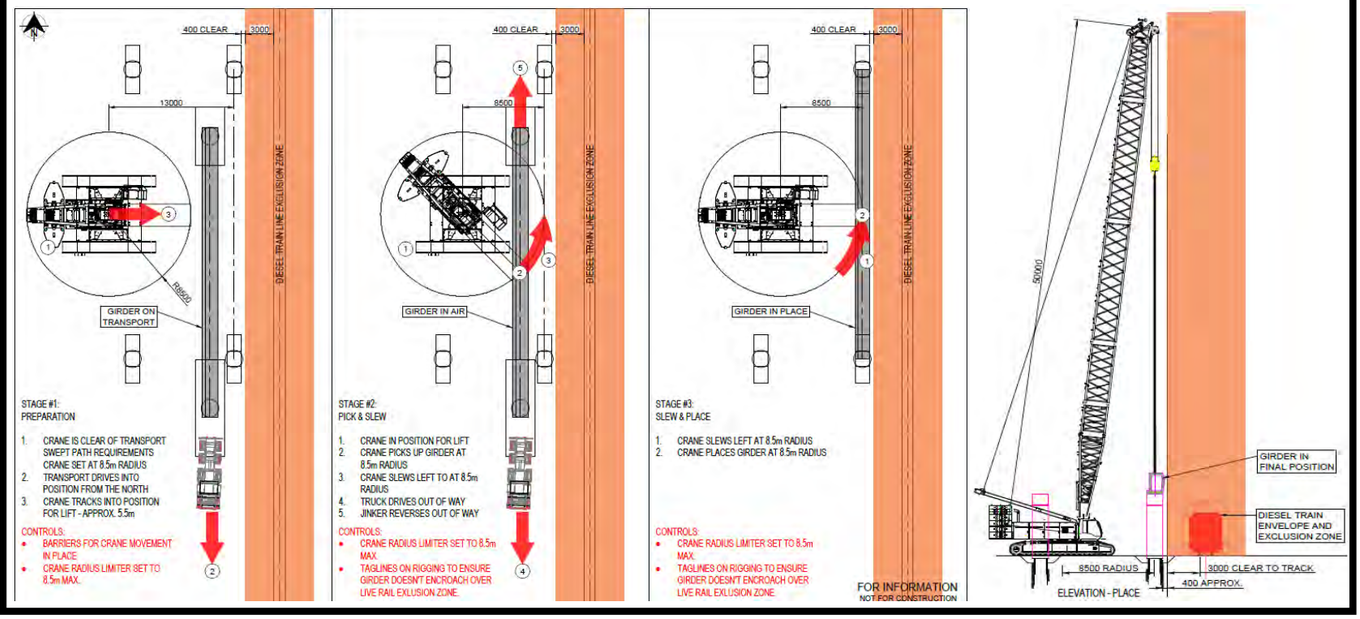
Installation of x4 precast beams

– BN15-W = 123.6T

– BN15-E = 123.6T

– BN16-W = 123.5T

– BN16-E = 123.5T



Construction Staging – Concept
Aston Williams

ARAGON COURT POSSESSION WORKS – Beam Installation (Stage 17)
(Precast Beam & Plank Install)

Stage 17 – Aragon Court Overview Plan:

LEGEND:

- Pile/Crane Pad		- PTA Adjusted Boundary	
- Protected Tree	*P*	- Site Entry Point	
- Special Consideration	*	- Local Traffic	
- Temporary Fencing		- Overhead Electrical	

Precast Installation:

Installation of x20 precast planks

– Plank Span 12

– Plank Span 13

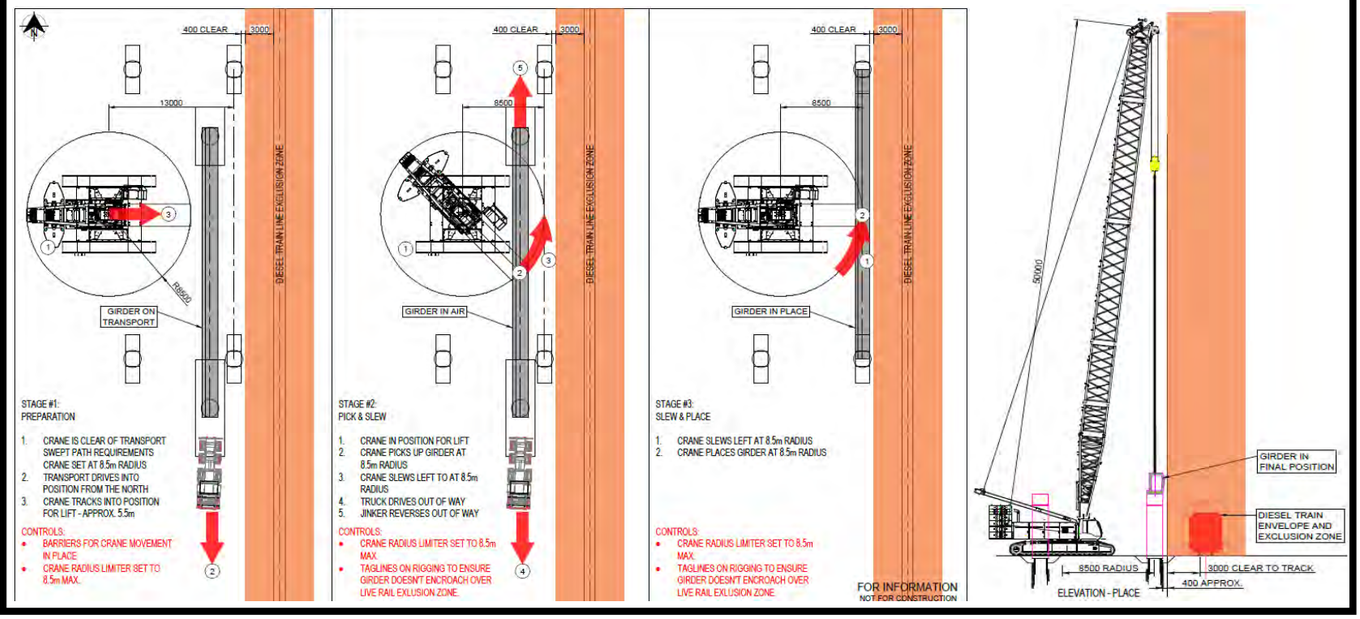
Installation of x4 precast beams

– BN15-W = 123.6T

– BN15-E = 123.6T

– BN16-W = 123.5T

– BN16-E = 123.5T

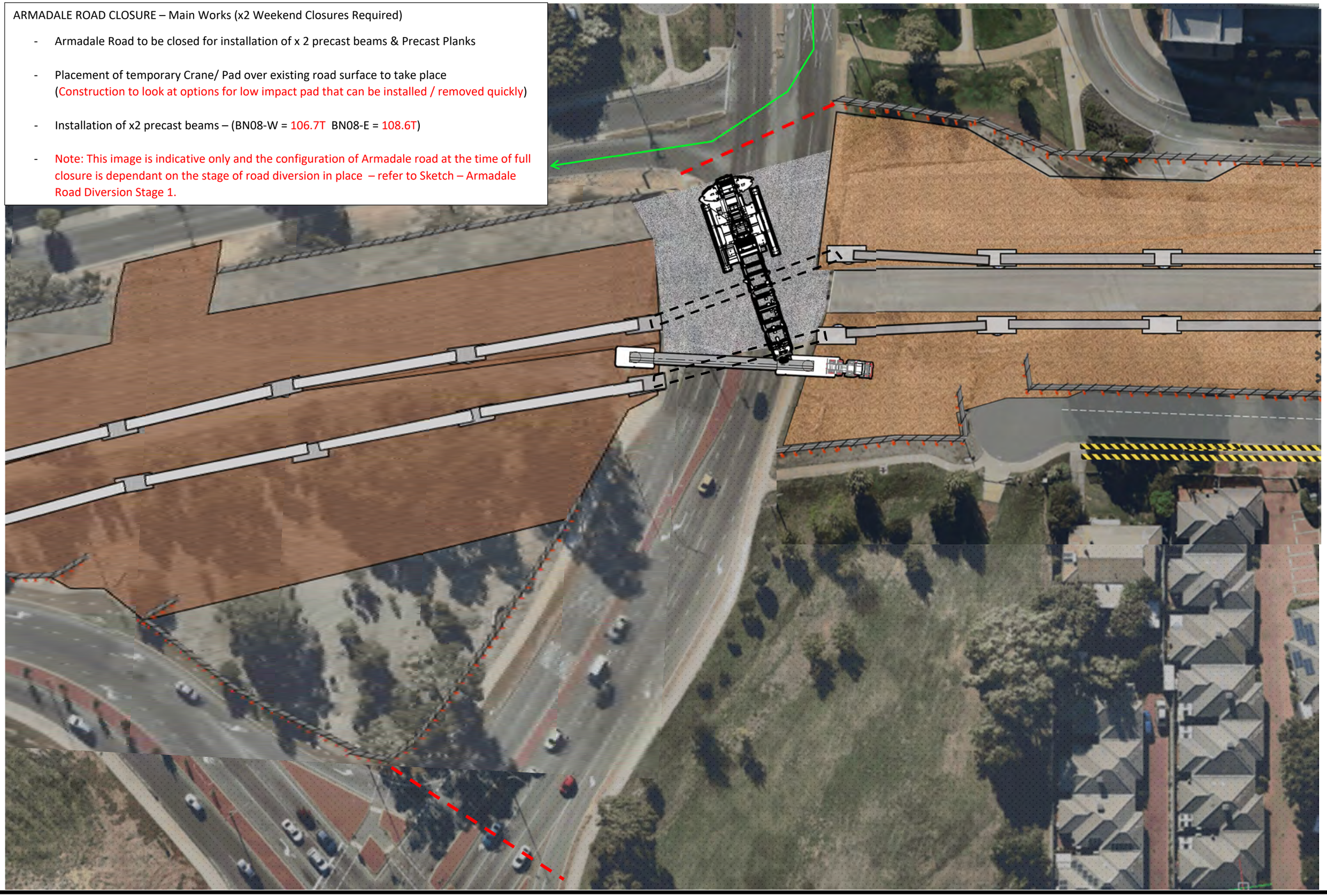


ARMADALE ROAD CLOSURE – Armadale Road
(Weekend Works – Full Road Closure)

Construction Staging – Concept
Aston Williams

ARMADALE ROAD CLOSURE – Main Works (x2 Weekend Closures Required)

- Armadale Road to be closed for installation of x 2 precast beams & Precast Planks
- Placement of temporary Crane/ Pad over existing road surface to take place (Construction to look at options for low impact pad that can be installed / removed quickly)
- Installation of x2 precast beams – (BN08-W = 106.7T BN08-E = 108.6T)
- Note: This image is indicative only and the configuration of Armadale road at the time of full closure is dependant on the stage of road diversion in place – refer to Sketch – Armadale Road Diversion Stage 1.



ARMADALE ROAD CLOSURE – Crane Movements (GENERAL LOGISTICS)
(Weekend Works – Full Road Closure)

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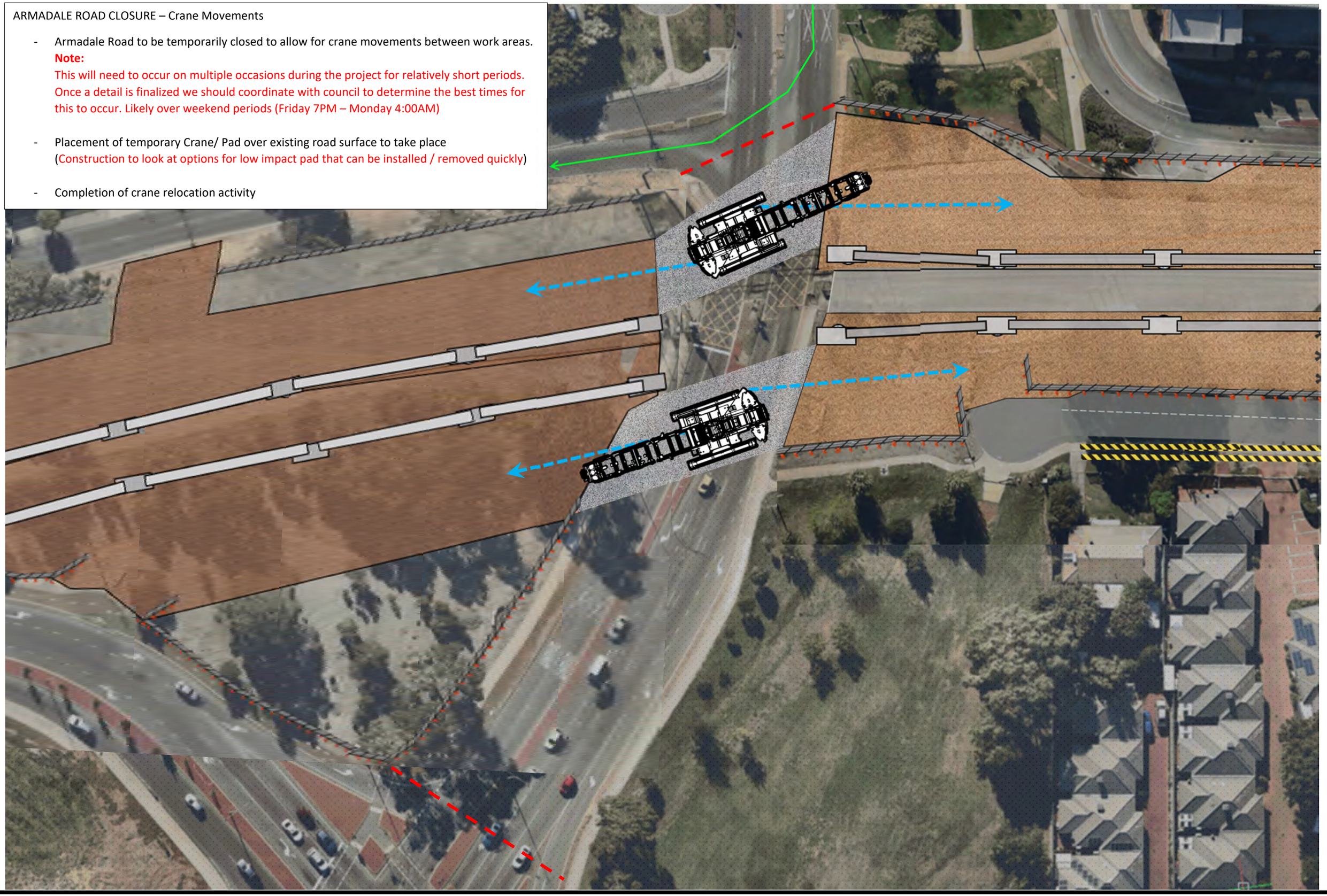
ARMADALE ROAD CLOSURE – Crane Movements

- Armadale Road to be temporarily closed to allow for crane movements between work areas.
  Note:
  This will need to occur on multiple occasions during the project for relatively short periods. Once a detail is finalized we should coordinate with council to determine the best times for this to occur. Likely over weekend periods (Friday 7PM – Monday 4:00AM)

- Placement of temporary Crane/ Pad over existing road surface to take place
  (Construction to look at options for low impact pad that can be installed / removed quickly)

- Completion of crane relocation activity



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NEERIGEN STREET CLOSURE – Possession Stage Works
(Partial Road Closure – Single Direction)

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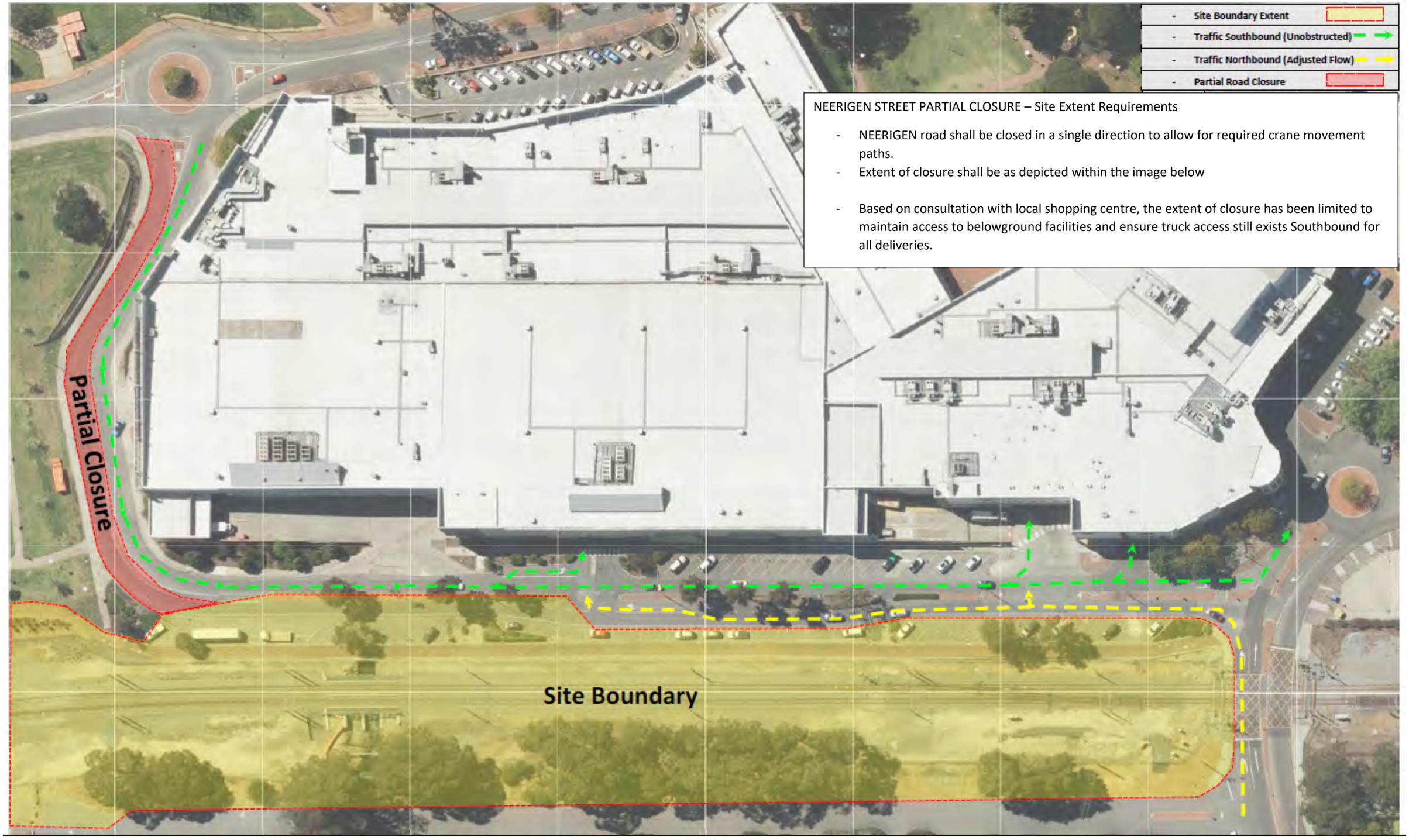

NEERIGEN STREET PARTIAL CLOSURE – Site Extent Requirements

- NEERIGEN road shall be closed in a single direction to allow for required crane movement paths.
- Extent of closure shall be as depicted within the image below

- Based on consultation with local shopping centre, the extent of closure has been limited to maintain access to belowground facilities and ensure truck access still exists Southbound for all deliveries.

Construction Staging Concept
– NEERIGEN STREET Partial Closure –
(North Bound)

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GREEN AVENUE FIRE STATION EARLY WORKS – Tree Removal (Stage 1)
(Temporary Fencing / PTA Boundary Shift / Tree Removal / Service Instigations)

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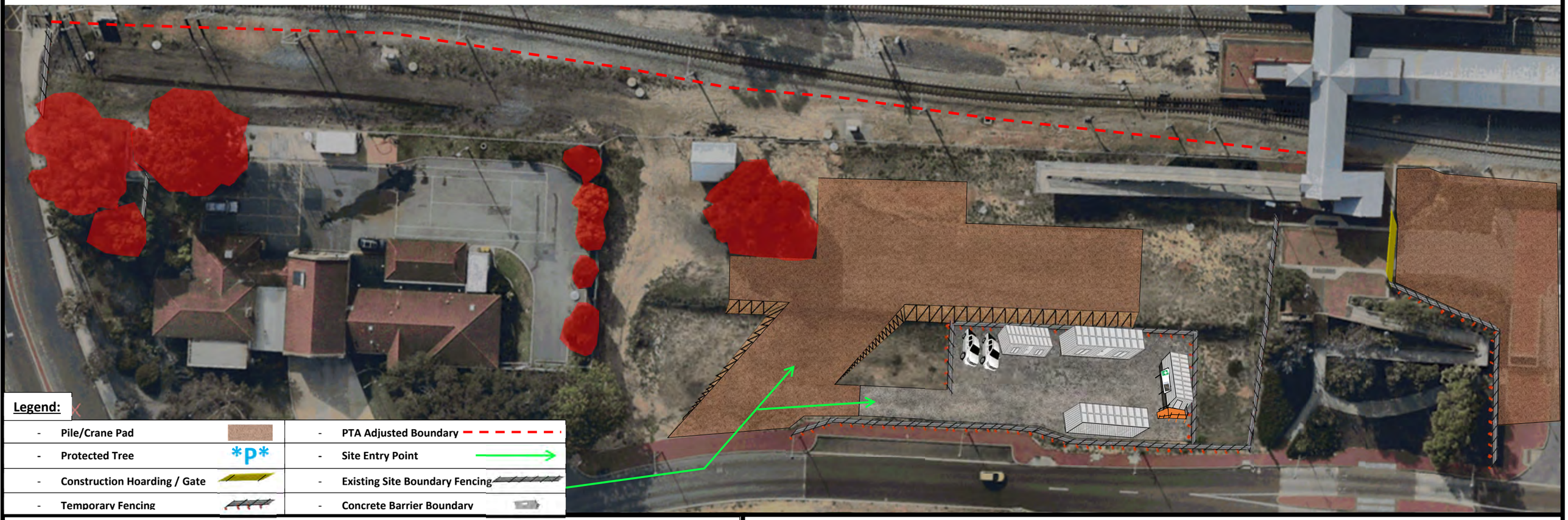


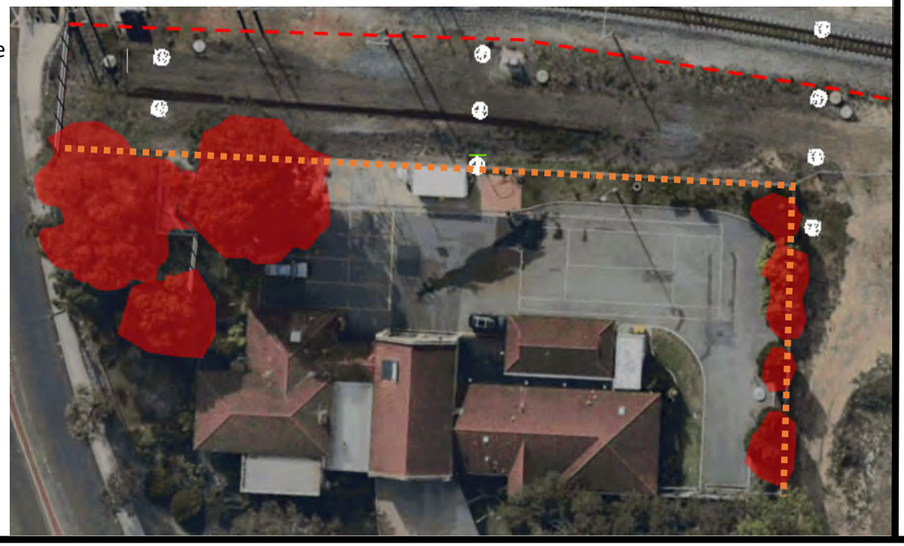
Fire Station – Tree Removal / Engagement

Fire station to be engaged early to coordinate the following activities

1. Removal of fire station existing fence in preparation for adjacent / overlapping works (Discussion of adjusted boundaries during the construction staging's)

2. Removal of Trees within fire station boundary / along fence line

3. Coordination of Fire station shed demolition & future use of fire station yard area for crane positioning.



PTA Boundary Shift – – – – –

1. PTA general exemption fence to be erected / moved as close to rail corridor as allowable, to allow for expansion of site zone
2. Existing PTA fence to be removed

Service Investigations / Clash Planning

1. All pile locations to be verified as either clear or known clash.

2. Where clashes are detected – service investigations shall identify asset owner and plan to be put in place for movement / relocation of service.

GREEN AVENUE FIRE STATION EARLY WORKS – Service Relocation & Demo (Stage 2)
(Temporary Fencing / PTA Boundary Shift / Tree Removal / Service Instigations)

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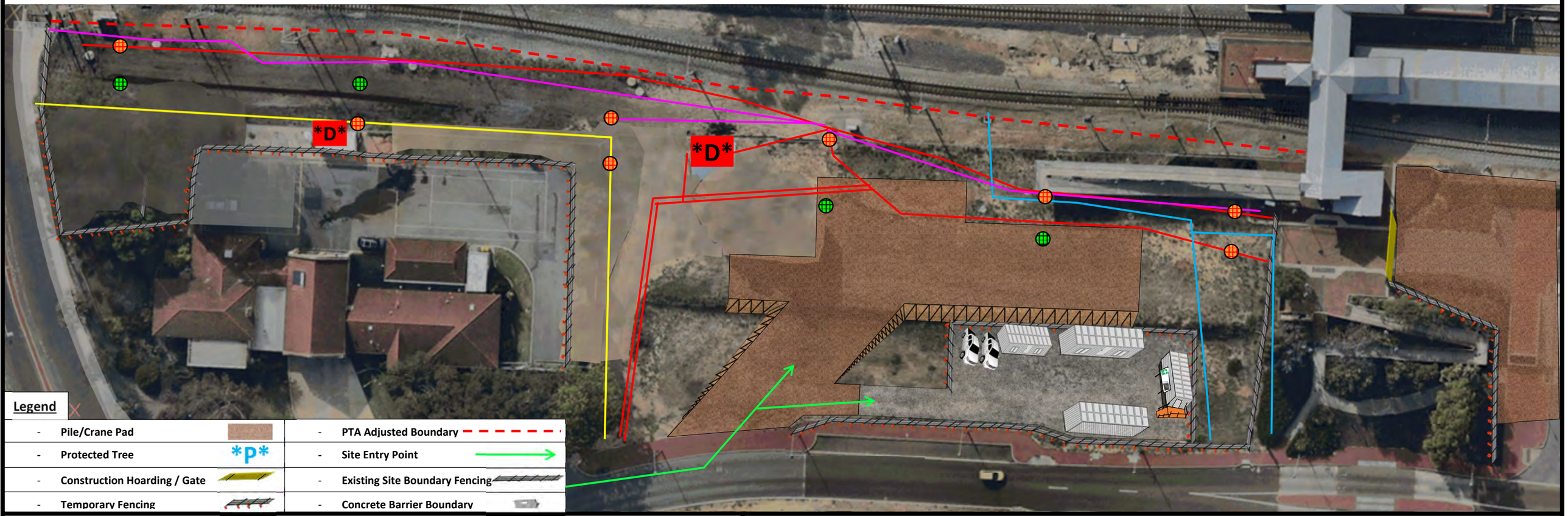
Aston Williams

MetCONNX



Legend

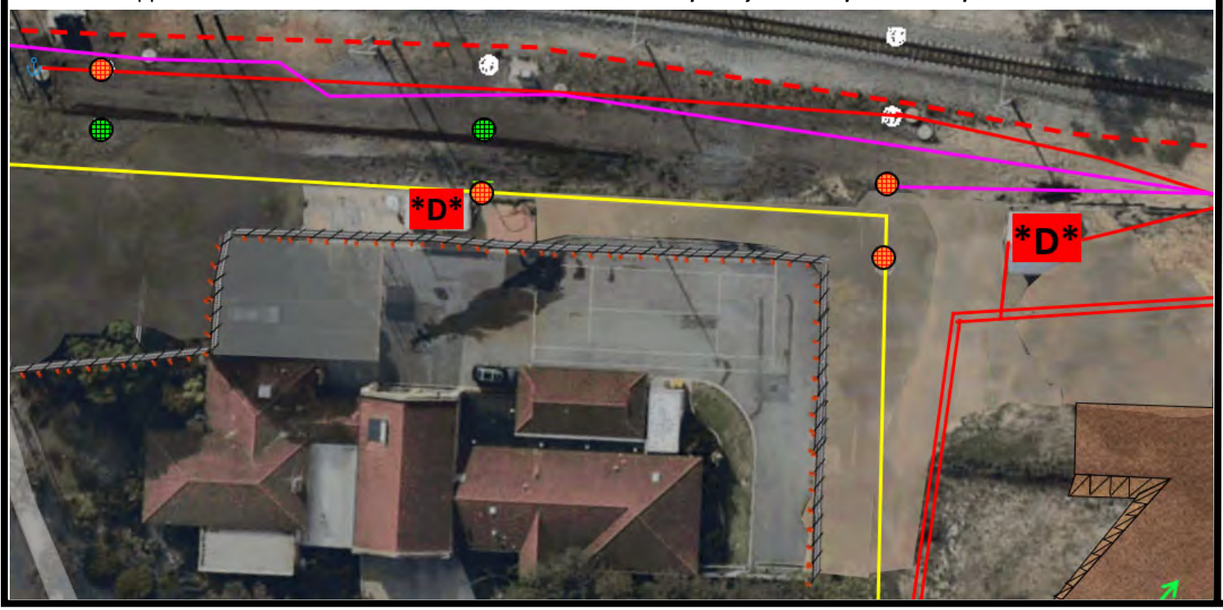
-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Fire Station Interaction / Demolition Works

1. Stage 1 Adjustment of Site boundary/ fire station boundary to be put in place.
   - Minor encroachment into fire-station yard (Yard possession staging's / encroachments to be agreed local authority)

2. *D* Demolition of fire station shed structure & Electrical shed to take place to negate works clashes.

* Refer to Appendix Document - ***Armadale Fire Station – DFES – Temporary Land Acquisition Proposal***



Service Clash / Service Relocation

1. Known Clashes:

- Pier 20-W / Pier 21-W (Hard Clash – Gas Line) -
  Note: Following on from gas line decommissioning, excavation and cut / removal of pipe will be required to prevent clash with pile rig auger.

- Pier 19-CW / Pier 21-CW / Pier 22-CW / Pier 23-CW / Pier 24-CW / Pier 24-W (Hard Clash – PTA & General Services)
  Note: All services to be investigated and asset owners confirmed/contacted. Services to be relocated to avoid piles.

Geotechnical / Temporary Works Assessment

Geotechnical temporary works designer to be engaged to complete an assessment of the following

1. Assessment of below ground services for loading of crane pad. (To be considered as part of crane pad design)
2. Assessment of Piling works in proximity to existing services (To determine if further protection / removal is required)
3. Design of Crane Pad Extension – Inclusive of crane pad over existing fire station yard
4. Design for protection of services (Where required based on initial geotechnical assessment)
5. Pile 23-CW is in proximity of existing pedestrian walkway structure. Temporary works engineer to assess and confirm that piling in this location does not pose a undermine risk / damage/failure of structure.

GREEN AVENUE FIRE STATION EARLY WORKS – Pile / Crane Pad Expansion (Stage 3)
(Expansion of Crane Pad)

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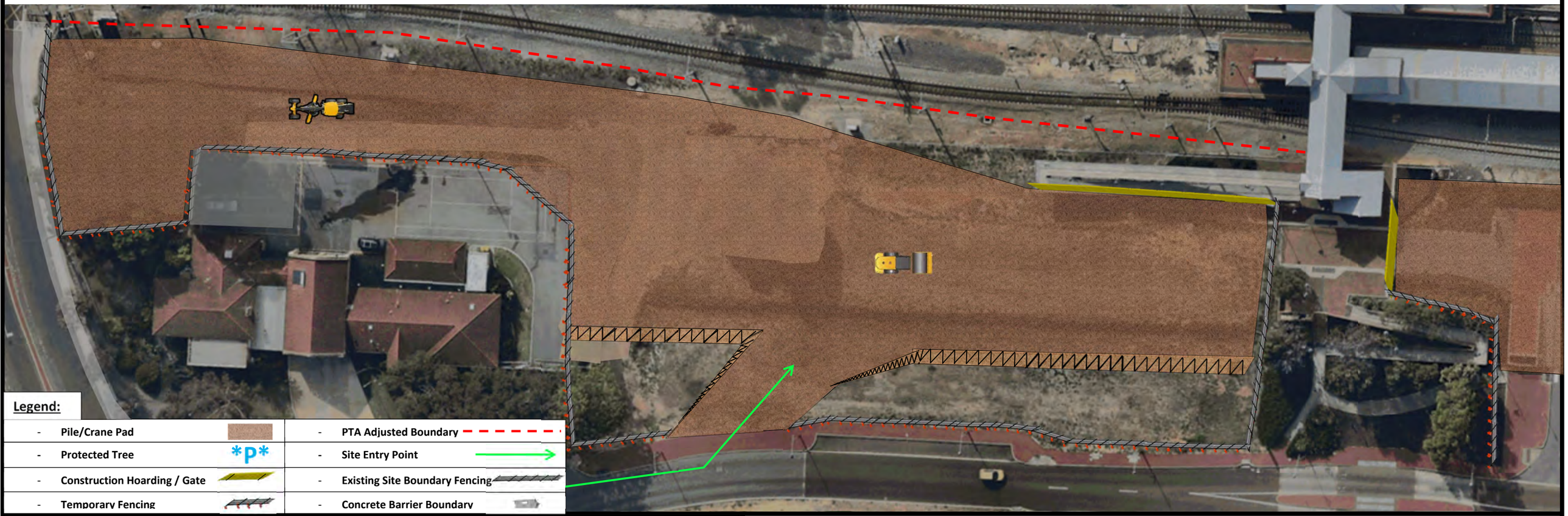


Pedestrian Protection Hoarding:

- Hoarding wall to be installed along the PTA access ramp to protect any pedestrians from piling works which will occur adjacent.

Mobilization of Plant and Materials:

- All plant & material deliveries shall occur via the Green Avenue main site access gate.

Services Relocation / Protection:

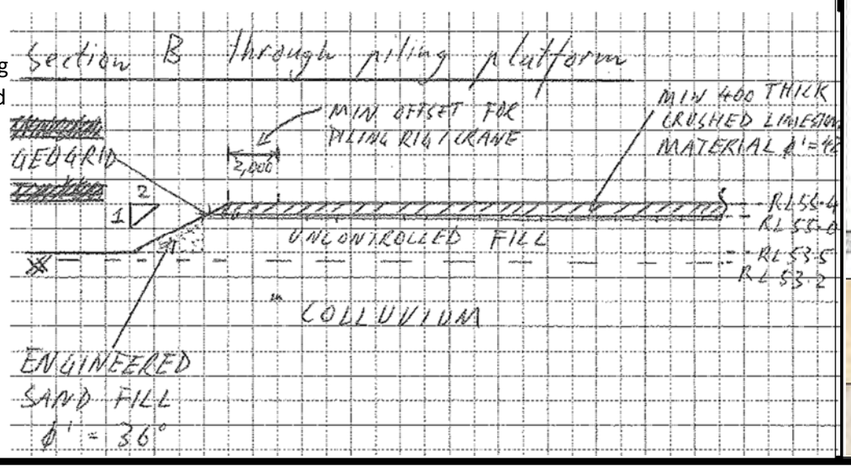
- Services assessment shall take place as part of the crane pad design to determine extent of protection to be put in place.
- Any additional service protection required based on design assessment shall be put in place at time of pad Construction.

Pad / Access Ramp Construction

- Build-up of limestone material along PTA edge of pad shall be established to provide physical barrier separation for all plant.

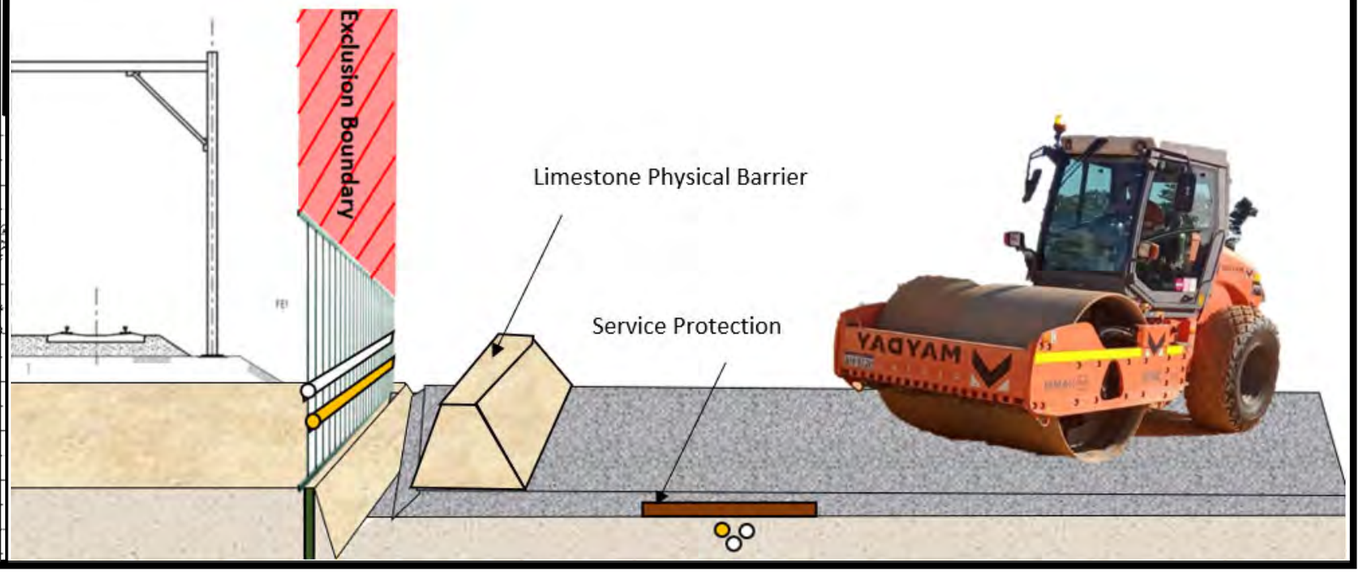
- Existing temporary site compound shall be adjusted or removed to allow for pad expansion of 10-15m towards the road.

- Pad shall extend all the way to fire station asphalt – overlapping slightly for future continuation.



Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



GREEN AVENUE FIRE STATION EARLY WORKS – Piling Works (Stage 4)
(Pile Construction)

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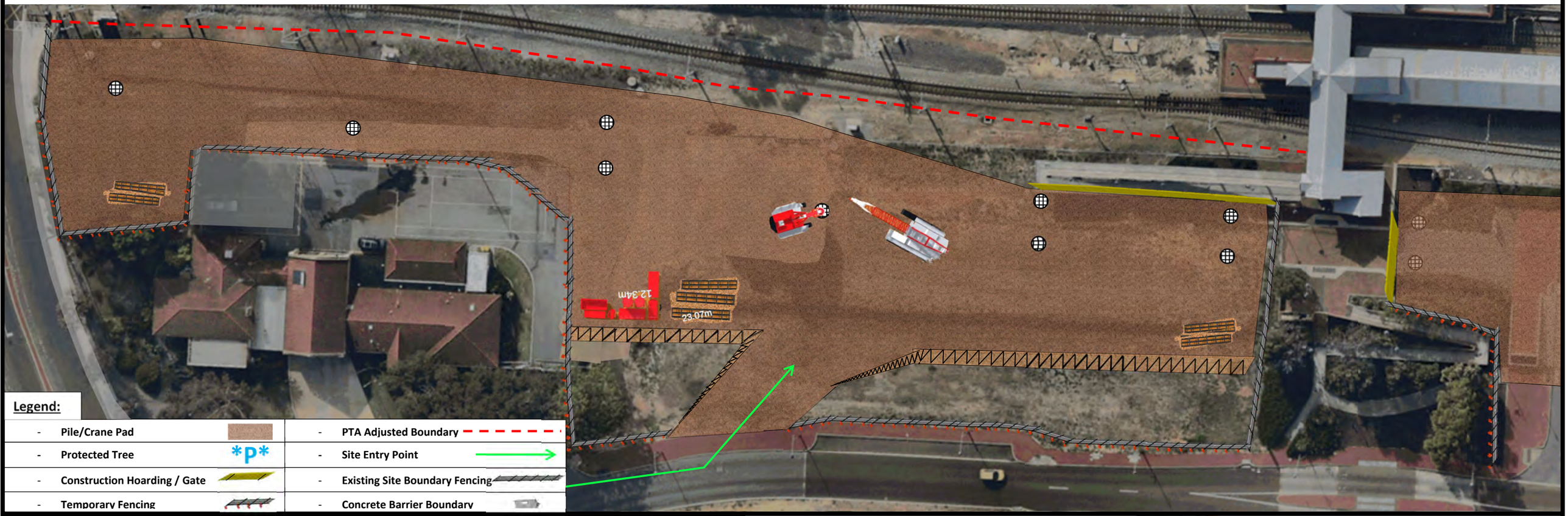
MetCONNX

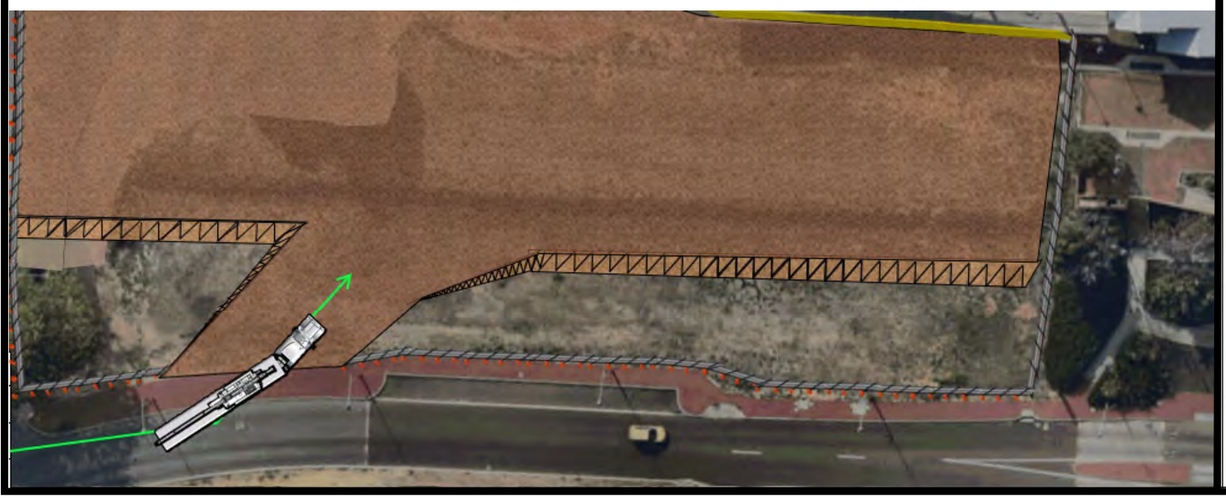


Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

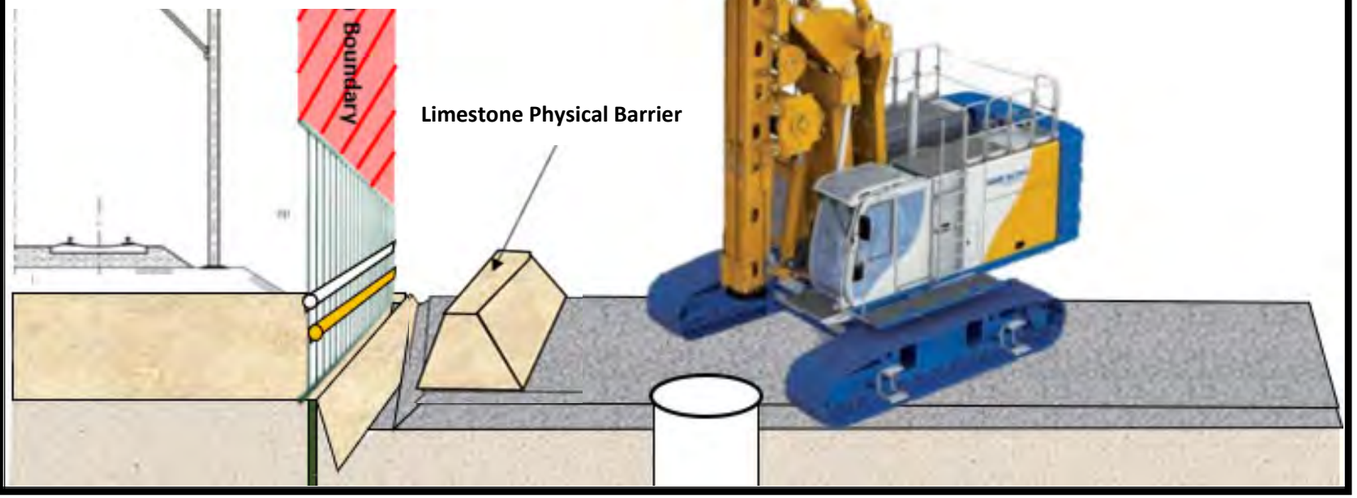
Oversize Deliveries:

- Green Ave Access Ramp



Piling Note:

1. **Pier 24-CW -Proximity to Adjacent Structure:**
   - proximity of an existing structure -(from centre of pile – 1.64m)
   - Piling contractor to review equipment operations in this location and confirm no clash.
   - Temp works assessment of the drillings potential impact on adjacent structure will need to be undertaken separately to confirm no impact on structure



Limestone Physical Barrier

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GREEN AVENUE FIRE STATION EARLY WORKS – Column Install (Stage 5)
(Precast Installation / Crane pad Expansion – Fire station Yard Possession)

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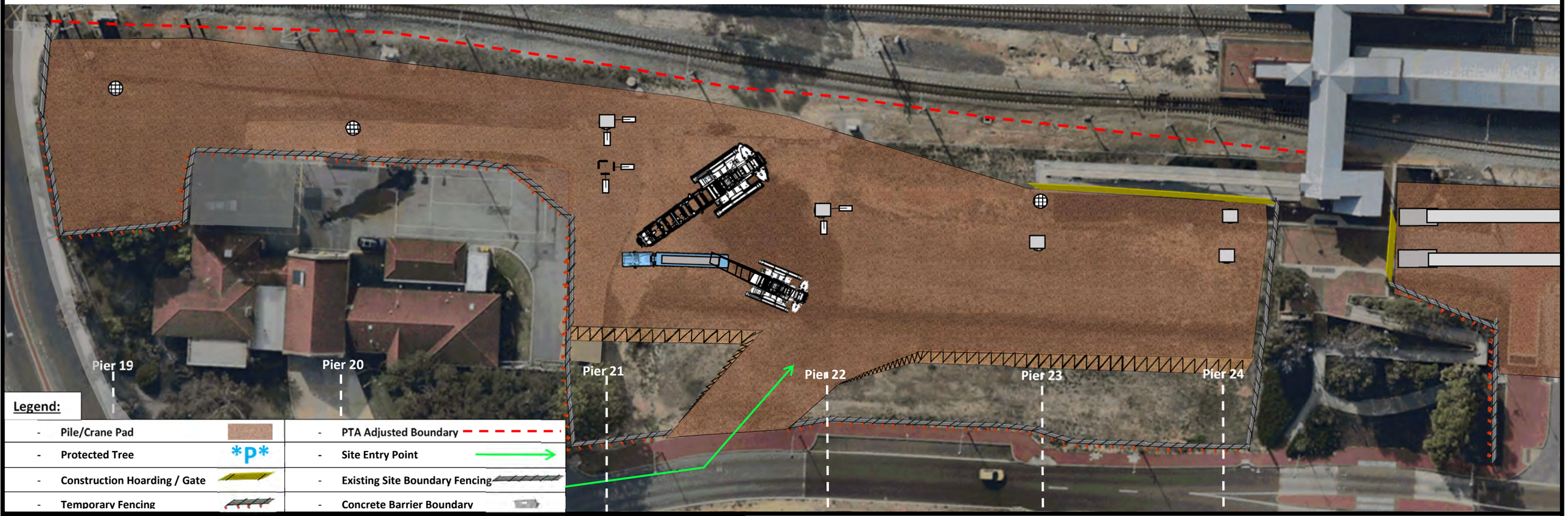


Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Construction Activities / DEFS Operations Coordination:

Description -

It has been discussed with DEFS that there will be specific high-risk activities which will require temporary cooperation / coordination with their firefighting staff. Such activities may require restrictions to be imposed on proximity to boundary fence or in

some occasions request access for certain plant / equipment to operate within the DEFS grounds. All such events shall be communicated and coordinated with the DEFS staff to ensure operations of the fire station are not impacted.

- Physical flagging / boundary will be established as a visual indicator of the exclusion zone.

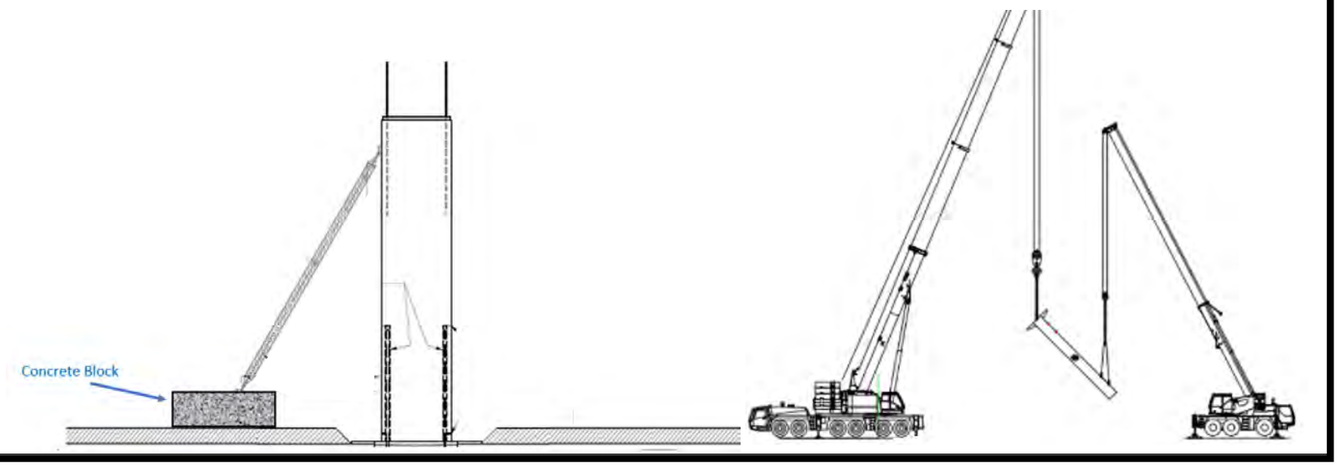
- BRE spotter shall be put in place to warn / instruct any public / DEFS staff who enter the vicinity of works.

Precast Installation:

Installation of x6 Columns - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Note:

Install of structural elements on Pier 23-CW may not be possible due to its extremely close proximity to the un-completed pile 22-CE.
Pre-loading of structure in this location may lead to higher risk of collapse when adjacent pile is bored in the possession stage.



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GREEN AVENUE FIRE STATION EARLY WORKS – Column Install (Stage 5)
(Precast Installation / Crane pad Expansion – Fire station Yard Possession)

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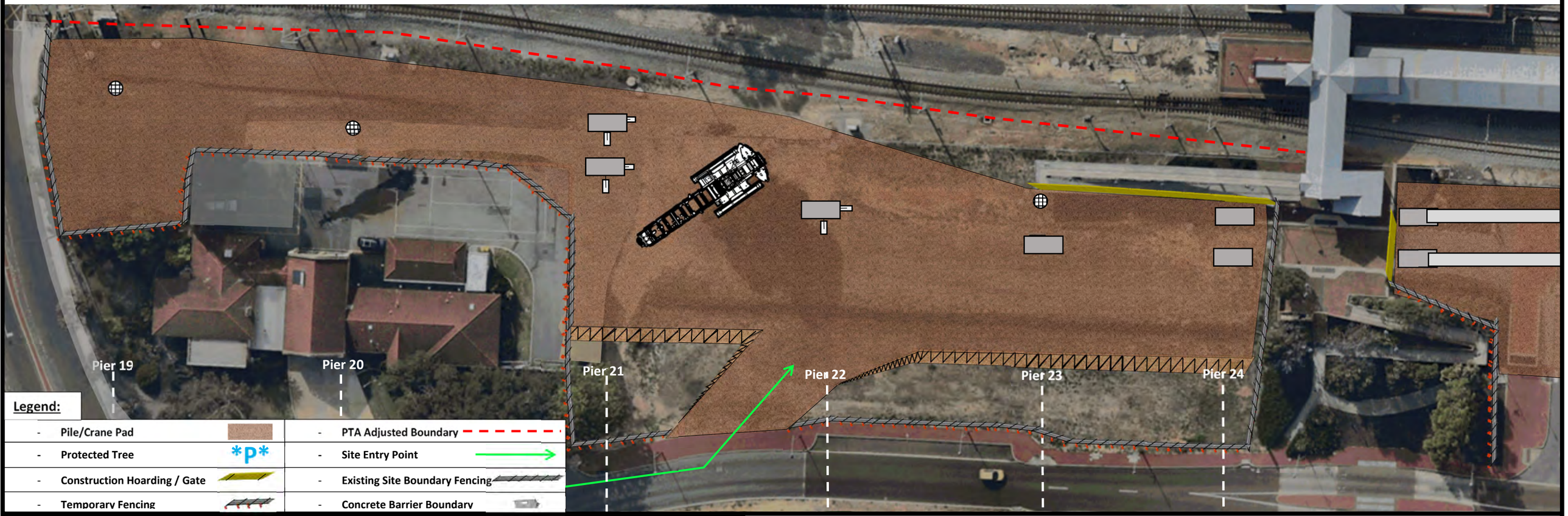


Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Construction Activities / DEFS Operations Coordination:

Description -

It has been discussed with DEFS that there will be specific high-risk activities which will require temporary cooperation / coordination with their firefighting staff. Such activities may require restrictions to be imposed on proximity to boundary fence or in

some occasions request access for certain plant / equipment to operate within the DEFS grounds. All such events shall be communicated and coordinated with the DEFS staff to ensure operations of the fire station are not impacted.

- Physical flagging / boundary will be established as a visual indicator of the exclusion zone.

- BRE spotter shall be put in place to warn / instruct any public / DEFS staff who enter the vicinity of works.

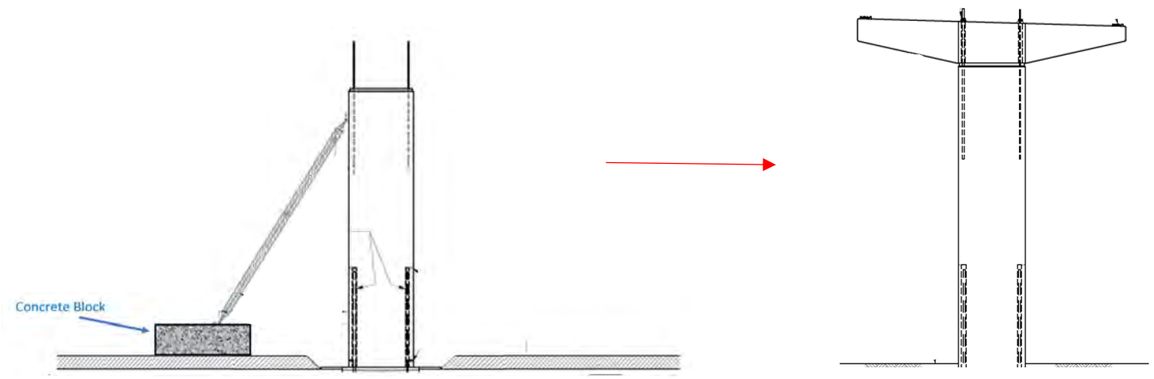
Precast Installation:

Installation of x6 Headstocks

Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Note:

Install of structural elements on Pier 23-CW may not be possible due to its extremely close proximity to the un-completed pile 22-CE. Pre-loading of structure in this location may lead to higher risk of collapse when adjacent pile is bored in the possession stage.



GREEN AVENUE FIRE STATION POSSESSION WORKS – Site Establishment
(Temporary Fencing / PTA Boundary Possession/ Tree Trimming / Service Instigations)

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Aston Williams

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Possession Site Establishment

Fire station to be engaged early to coordinate the following activities

1. Removal of existing East car-park fence and establishment of temporary fence boundary along this site edge, pushing site boundary to align with existing back of shop.

2. Trimming of Trees within zone will occur to arborist recommendations

3. Placement of concrete barriers beside existing precast columns to provide a physical barrier from all construction equipment.

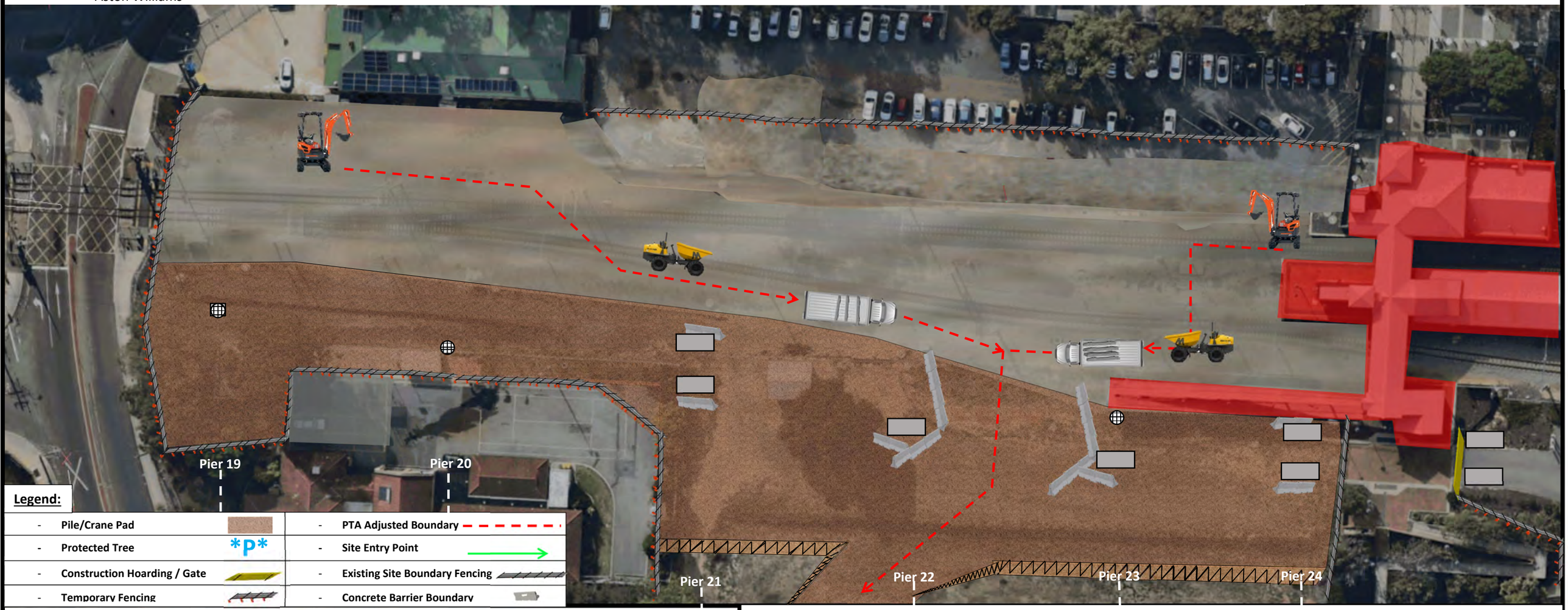
Decommissioning of all PTA Assets:

- Decommissioning of all live rail assets to commence as soon as possession period begins.

GREEN AVENUE FIRE STATION POSSESSION WORKS – Rail Demolition
(Removal of All Rail Assets / Commencement of Armadale Station Demolition)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Rail Demolition:

- Decommission / Remove all Rail electrical / Coms Assets

- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

Geotechnical Testing:

- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

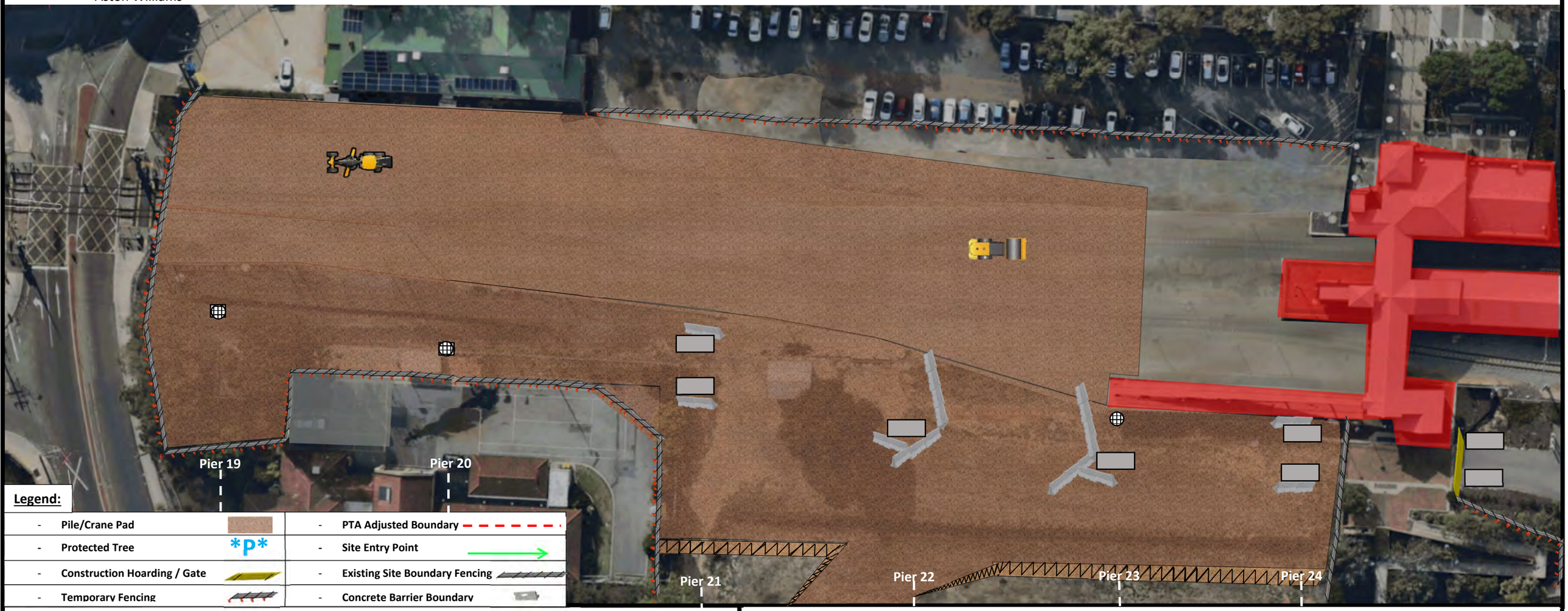
Commencement of Armadale Station Demolition:

- Early Demolition preparation works to commence / propping / staging

GREEN AVENUE FIRE STATION POSSESSION WORKS – Piling / Crane Pad Extension
(Crane Pad Construction – Part 1)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Mobilization of Plant and Materials:

- All plant & material deliveries shall occur via the Green Avenue main site access gate

Services Relocation / Protection:

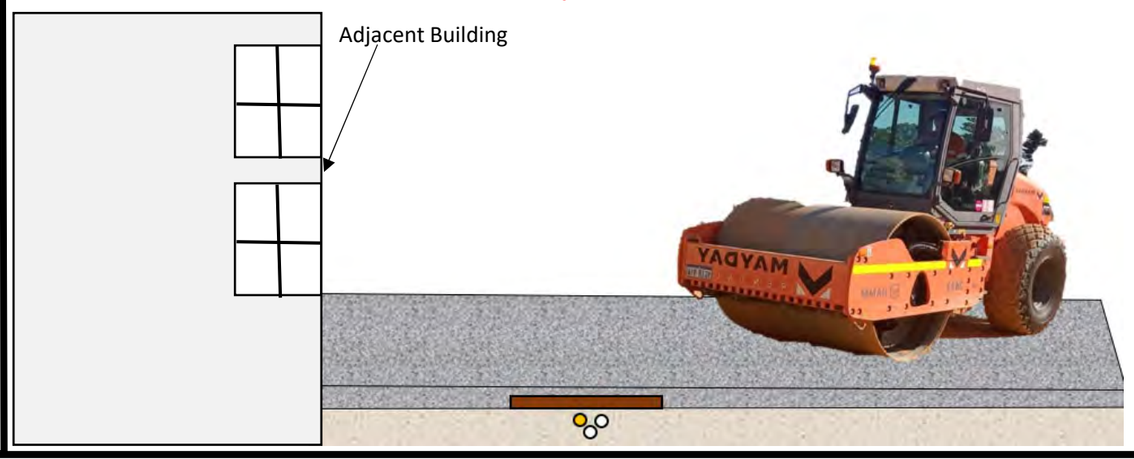
- Services team to identify all PTA services / service pits which run within the planned pad construction zone.
- Services to either be relocated / decommissioned or protected via temporary works prior to pad construction.

Demolition of Armadale Station – Ongoing:

- Early-stage demolition works should focus on 1. Pedestrian Ramp & 2. Northern platform in order to clear the way for piling works.

Crane / Piling Pad Construction:

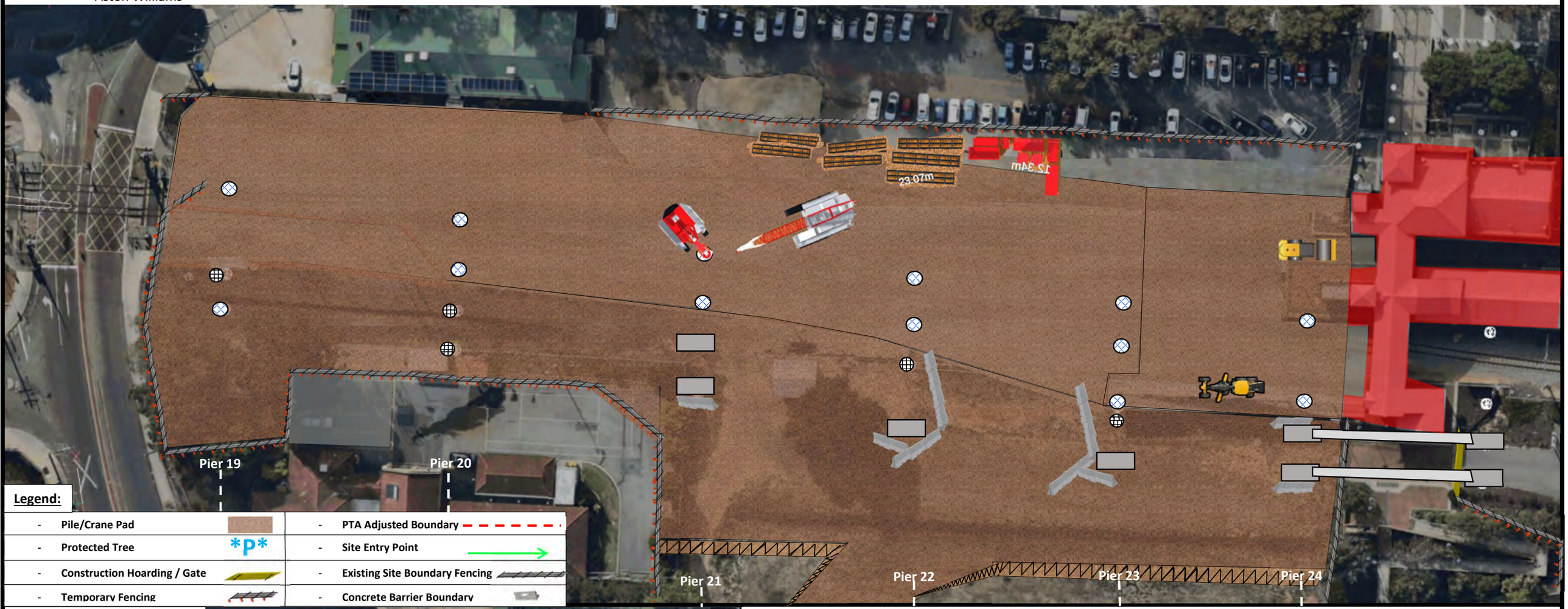
- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.
- **NOTE * : Crane Pad will be adjacent to a existing property. Temporary works assessment for crane pad in this zone should consider this element as well as future crane operational loads.**



GREEN AVENUE FIRE STATION POSSESSION WORKS – Piling Works / Crane Pad Extension
(Commencement of Piling / Crane Pad Construction – Part 2)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

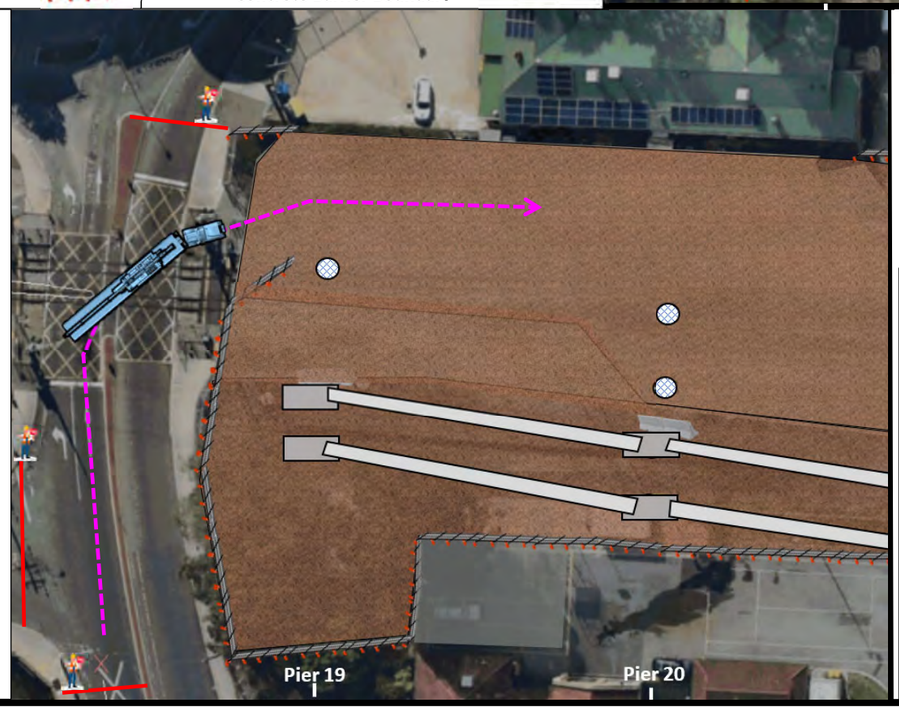
-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

- For the mobilization of large equipment (Crane/Piling Rigs/Beam deliveries)

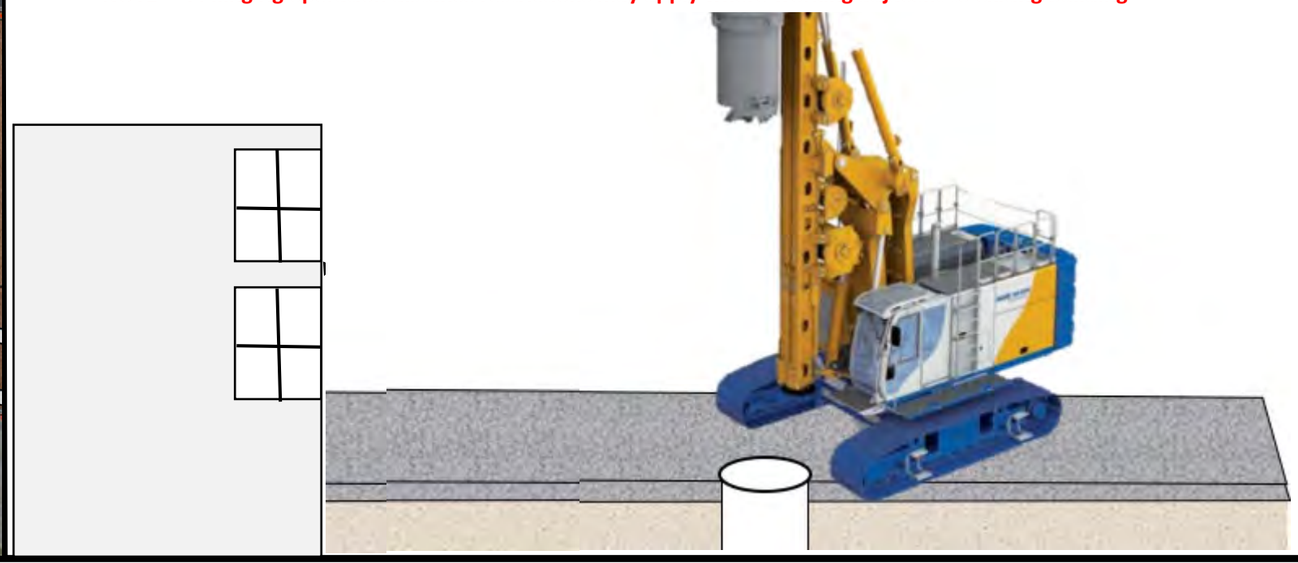
Alternative route into site location may be required. (Routes to be planned).

This shall be managed via on site traffic management resources and will be completed as required.



Piling Works:

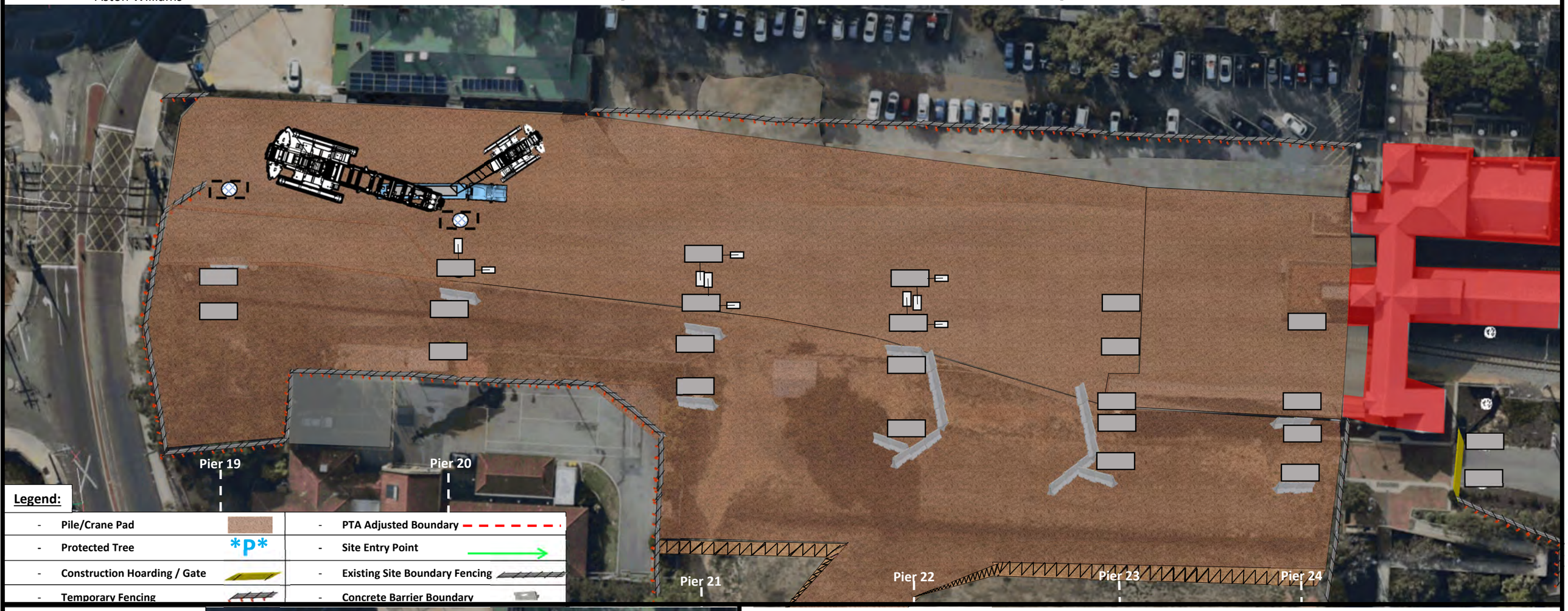
- Completion of x15 Piles within Aragon court zone – Bore / Install Reo Cage / Concrete Pour
- **NOTE * : Piling rig operation distance restrictions may apply where working adjacent to exiting building**



Construction Staging – Concept
Aston Williams

GREEN AVENUE FIRE STATION POSSESSION WORKS – Column Erection
(Column & Headstock Install - Pier 19-24)

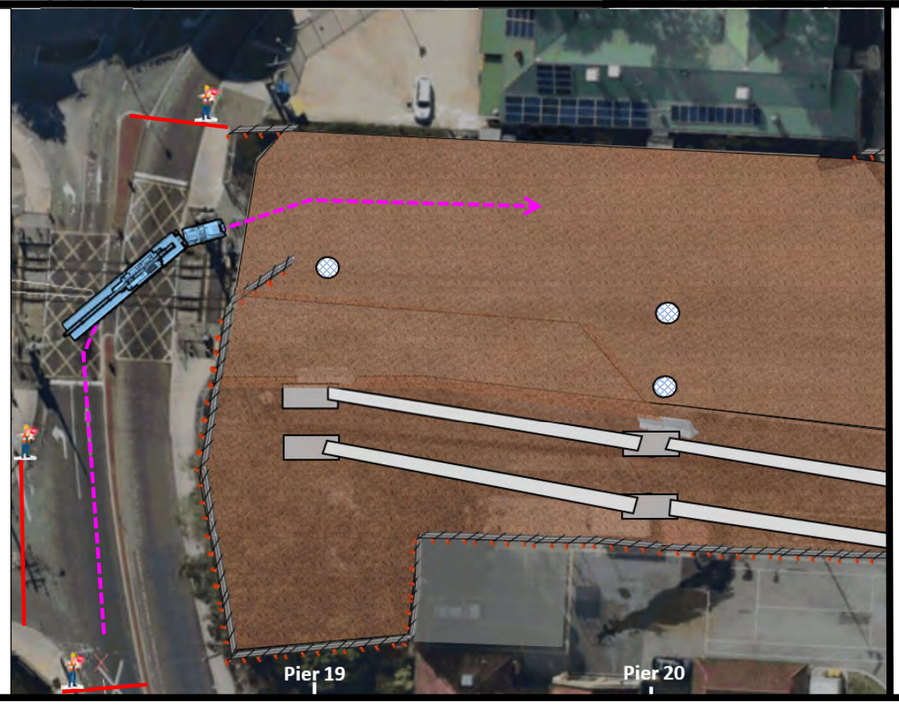
MetCONNX



Oversize Deliveries:
- For the mobilization of large equipment (Crane/Piling Rigs/Beam deliveries)

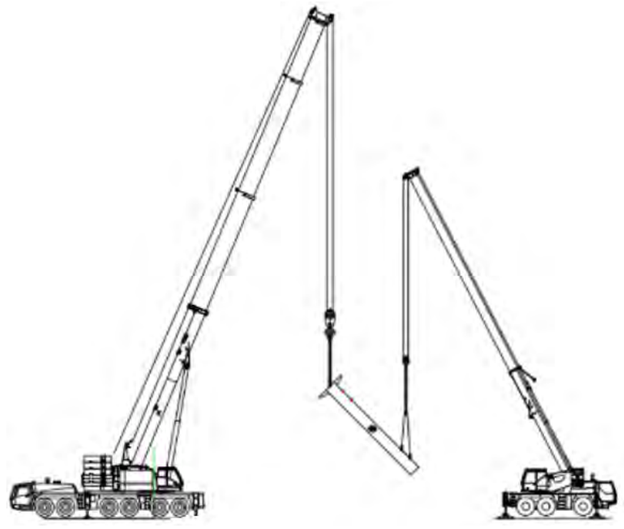
Alternative route into site location may be required. (Routes to be planned).

This shall be managed via on site traffic management resources and will be completed as required.



Precast Installation- Columns / Headstocks:

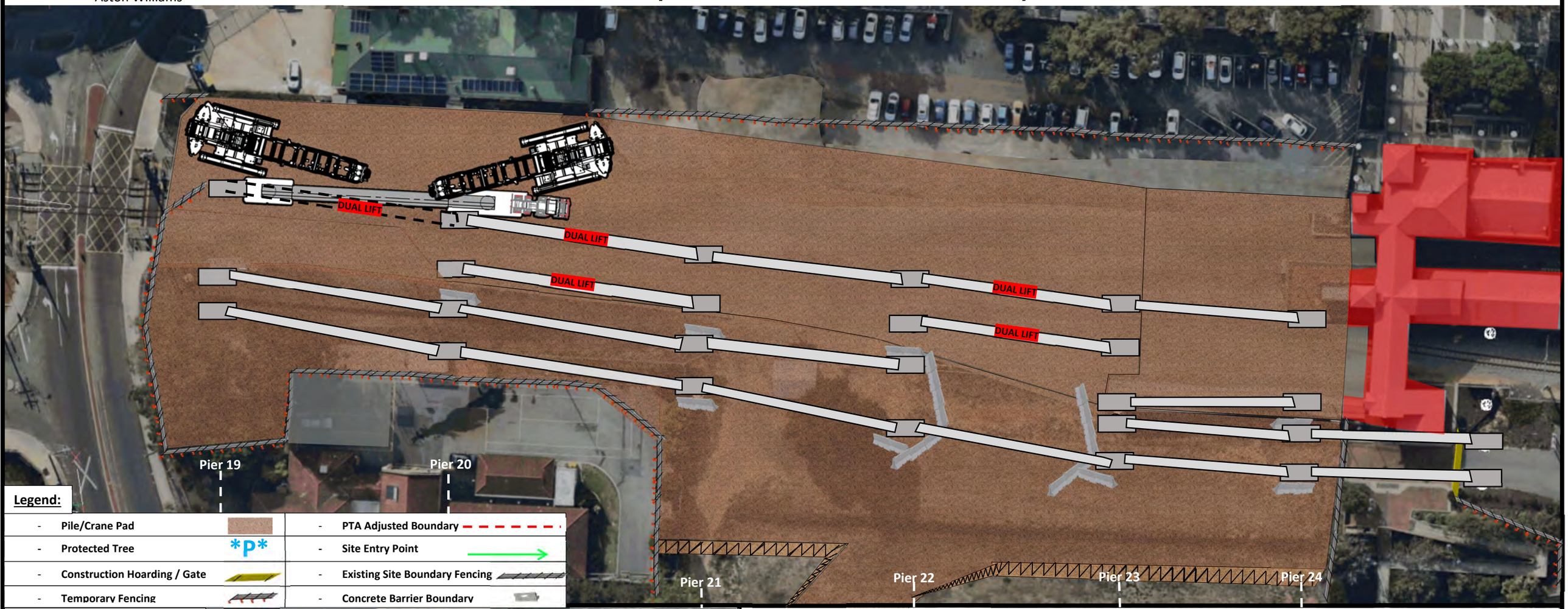
Installation of x18 Columns & x 16 Headstocks - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.



GREEN AVENUE FIRE STATION POSSESSION WORKS – Beam Installation
(Beam & Plank Install - Pier 19-24)

Construction Staging – Concept
Aston Williams

MetCONNX



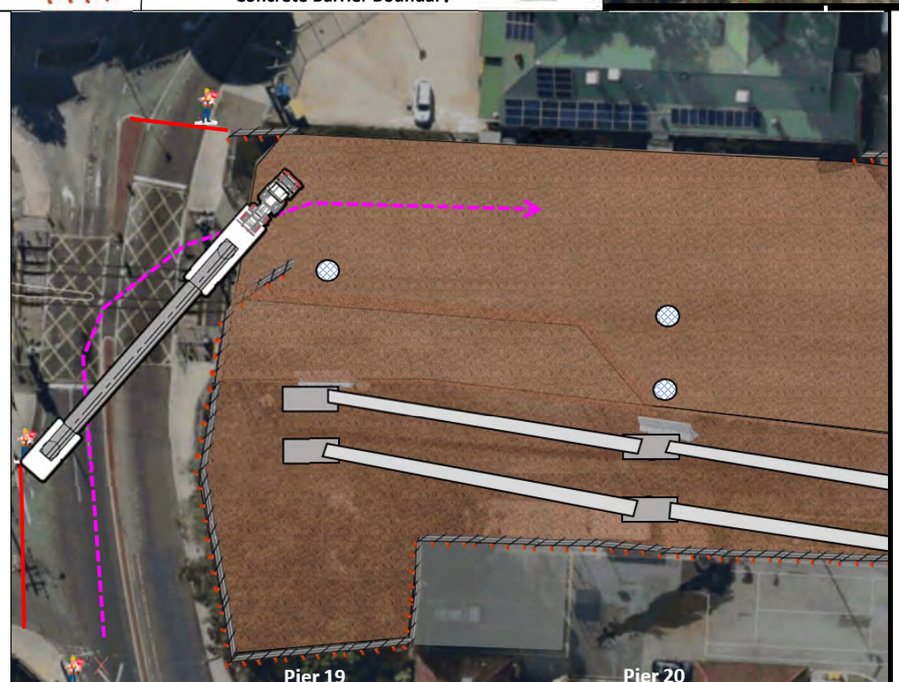
Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:
- For the mobilization of large equipment (Crane/Piling Rigs/Beam deliveries)

Alternative route into site location may be required. (Routes to be planned).

This shall be managed via on site traffic management resources and will be completed as required.

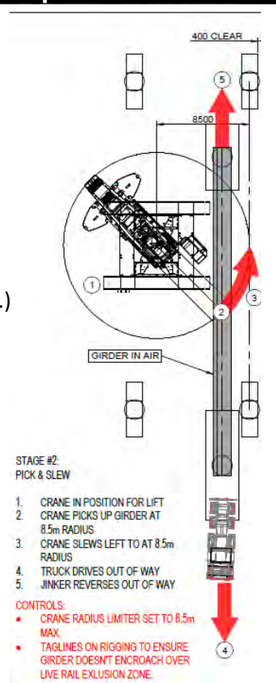


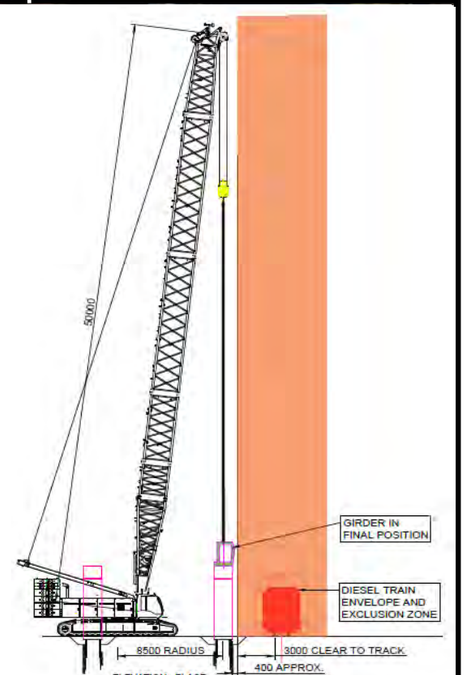
Precast Installation- Beams / Planks:

Installation of Precast Beams x 19
- Weights of Beams Vary & a number exceed capacity of a single crane – requiring Dual Lift to occur.

Installation of Precast Planks x 145
- (Planks Excluded from imagery for clarity of works space.)

- **Plank Span 20**
- **Plank Span 21**
- **Plank Span 22**
- **Plank Span 23**
- **Plank Span 24**





FORREST ROAD CLOSURE – Beam Installation
(Precast Beam Install)

Construction Staging – Concept
Aston Williams

MetCONNX

FORREST ROAD CLOSURE – Main Works

- Forest Road to be closed for installation of x 3 precast beams & Full span Precast Planks

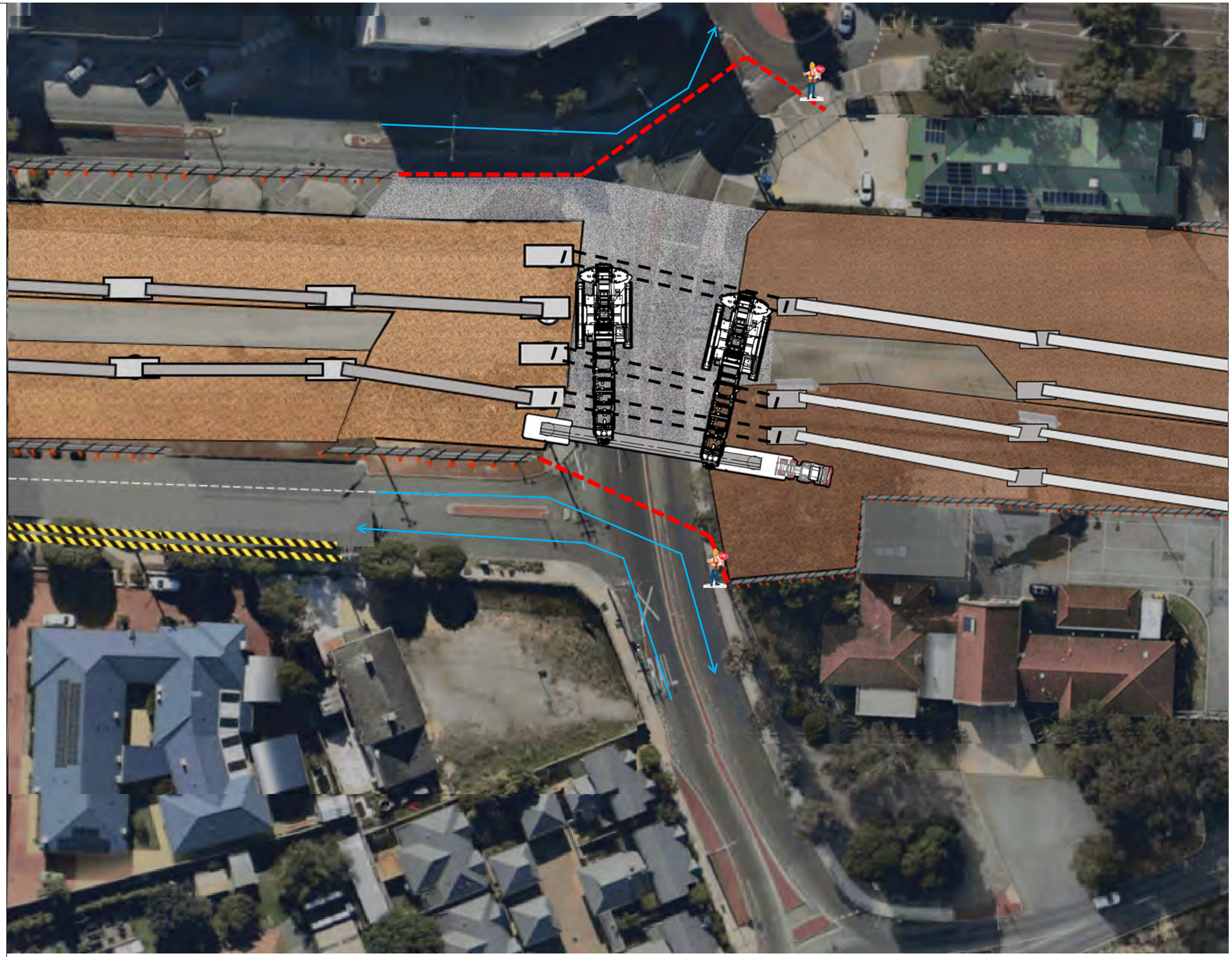
- Placement of temporary Crane/ Pad over existing road surface to take place
(Construction to look at options for low impact pad that can be installed / removed quickly)

- Installation of x3 precast beams –
BN19-W = 151.5 T
BN19-CW = TBC
BN19-E = 151.5 T

- Signage to be placed at roundabout to notify of main road closure and indicate that the adjusted rout is open to local traffic only (Residents)

- Central median to be modified to allow local residents to turn right out of Aragon court onto Forest Road.

Note:
This will need to occur on multiple occasions during the project for relatively short periods.
Once a detail is finalized, we should coordinate with council to determine the best times for
this to occur. Likely over weekend periods (Friday 7PM – Monday 4:00AM)



Draft – For Internal Review
Aston Williams -25/01/23

Armadale Fire Station
– DEFS –
Temporary Land Acquisition Proposal

This document comprises of the current proposal of works put forward by BRE to allow for temporary acquisition of DEFS land for the purpose of construction associated with the new **Byford Rail Extension** project.

- Subsequent pages detail the specifics of the proposal to accommodate the operational requirements put forward by the ***Department of Fire and Emergency Services during*** the engagement meeting held 18/01/2023 & the fire station site visit held 24/01/2023

The list below provides an itemized summary of the elements discussed here within

- Temporary land acquisition from DEFS for project works
- Accommodating works to allow for undisrupted operation of existing Armadale fire station
- Relocation of existing services (Where required)
- Removal of Trees within required work zones

The below plan image depicts the extent of land which BRE proposes be temporarily taken from the fire-station for the period of time associated with construction works within this area.

Draft – For Internal Review
Aston Williams -25/01/23

Section 1: Asset Relocations & Removals

In order for BRE to take temporary possession of the parcel of land depicted, there are a number of DFES assets within these areas which will need to be addressed. This section of this document outlines each of these assets and describes the proposed methodology of management.

Asset 1: Spotlight Tower

Description -

DFES current utilize a spotlight tower for night-time activities within their yard. This asset falls within the currently planned parcel of works that BRE require for early operations.

Proposal for Asset Management:

It is proposed that BRE shall disconnect and dispose of the existing spotlight and provide a suitable replacement.
- Replacement shall provide the same or better light coverage
- Existing light is controlled via manual switch from within fire station garage area (New lighting system shall be installed with similar functionality)
- It is proposed at this time that new lights be mounted to the brick columns indicated in the image to the right, facing outward into the yard area.

Asset 2: Fire Hydrant

Description -

DFES current utilize a fire hydrant for ongoing training & emergency purposes within the fire station grounds. This asset falls within the currently planned parcel of works that BRE require for early operations.

Proposal for Asset Management:

It is proposed that BRE shall disconnect and relocate this fire hydrant such that it sits outside of the planned works boundary.
- The image to the left depicts the fire hydrant current position and the proposed relocation.
- Upon completion of works, the fire hydrant shall be relocated back to its original position as part of the 'Make-Good' for the area.

Asset 3: Storage Shed

Description -

DFES current utilize a storage shed along their boundary as a secure location for storage of training equipment. This asset falls within the currently planned parcel of works that BRE require for early operations.

Proposal for Asset Management:

It is proposed that BRE shall relocate this shed to another suitable location within the fire station grounds.
- see below section Accommodation works for proposed positioning of shed (Pending finalization of hardstand area proposal)
- The new location of the shed shall be its permanent location.

Section 1: Asset Relocations & Removals (Continued)

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Asset 4: Training Tower

Description -

DFES current utilize a steel training tower structure for the purposes of their drills/training activities held within the yad space. This asset falls within the currently planned parcel of works that BRE require for early operations.

Proposal for Asset Management:

It is proposed that BRE shall remove this asset from the fire station and relocate it to the nearby Armadale running track where it can be utilized.
- BRE shall cut bolts of the existing structure and load it onto a transport for relocation
- BRE shall engage designer to assess foundational requirements / bolt requirements for the structure's new location.
- BRE shall relocate install the tower at its new permanent location.

Asset 5: Basketball Hoop

Description -

DFES current have a basketball hoop along the boundary of the intended work zone.

Proposal for Asset Management:

- Remove and dispose of
  (Discussions with DFES have advised that a mobile basketball hoop can be arranged in the event that there are any internal grievances with its removal – However the hoop itself is not an asset they are concern with being removed at this time).

Asset 6, 7, 8: Trees

Description -

There are currently a number of sizable trees within the DFES property boundary which will need to be removed as part of the project scope.

Proposal for Asset Management:

Tree #1 – Clashes with project works. BRE propose tree is removed

Tree #2 – Clashes with project works. BRE propose tree is removed

Tree #3 – As part of the accommodation works proposed (See next section), it is proposed that tree 3 is removed in order to make room for additional hardstand zone for fire station operations.

Tree #4 – Tree falls on boundary of project footprint. It is proposed that this tree is retained with the potential for trimming where required to assist In clash prevention.

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Aston Williams -25/01/23

Section 2: Boundary Alterations

Construction Phase Temporary Fencing

Description -

Following on from the completion of asset relocations / removals – BRE shall commence the removal of existing boundary fencing around the DEFS facility and establishment of a temporary fencing boundary for the duration of the construction period.

- Removal of existing fencing between PTA land and DEFS land

- Placement of temporary fencing between newly established site boundary and DEFES grounds.

Stage 1 – Existing Boundary Fence Removal

Stage 2 – Establish Temporary Fence Boundary

DEFS Permanent Fence Adjustment (Part of Accommodation Works – see next section)

Description -

During discussions with DEFS around special requirements for their onsite training, they have requested that their existing fence boundary be shifted to provide additional grounds to compensate for the area lost to construction activity.

- Removal of existing fencing along northern boundary

- Establishment of new permanent fence to the standard of existing or better.

Stage 3 – Northern DEFS Fence Removal

Stage 4 – Establishment of New Northern Fence

Section 3: Accommodation Works

Provision of Additional Hardstand

Description -

It has been discussed with DEFS that it is their preference that the lost area of land during construction be replaced with an additional hardstand / undercover area. This new area shall be utilized as both a space for training activities & to house a number of the relocated storage items (Shed etc..).
It is proposed that BRE conduct the following modifications to the DEFS grounds to accommodate their requests.

- Removal of Tree within hardstand expansion zone

- Removal of garden beds within the hardstand expansion zone

- Adjustment to existing fence boundary to accommodate new hardstand area.

- Extension of concrete slab (Hardstand area) – Fall to be incorporated to maintain drainage requirements for the zone.

- Erection of minor undercover structure to provide shaded outdoor training area.

Section 4: Construction Coordination

Construction Activities / DEFS Operations Coordination:

Description -

It has been discussed with DEFS that there will be specific high risk activities which will require temporary cooperation / coordination with their firefighting staff. Such activities may require restrictions to be imposed on proximity to boundary fence or in some occasions request access for certain plant / equipment to operate within the DEFS grounds. All such events shall be communicated and coordinated with the DEFS staff to ensure operations of the fire station are not impacted.

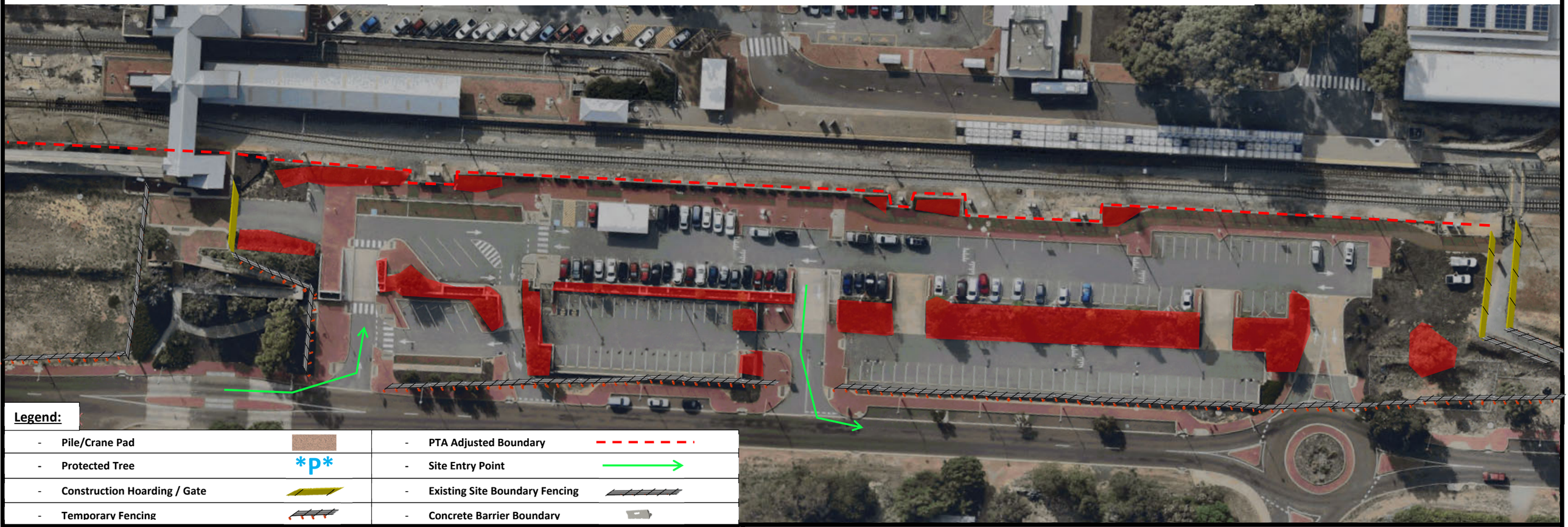
- Physical flagging / boundary will be established as a visial indicator of the exclusion zone.

- BRE spotter shall be put in place to warn / instruct any public / DEFS staff who enter the vicinity of works.

Construction Staging – Concept
Aston Williams

GREEN AVENUE CAR PARK EARLY WORKS – Tree Removal (Stage 1)
(Temporary Fencing / Service Management / Pedestrian Management)

MetCONNX



Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Northern Zone – Early Works

- **Construction Hoarding** to be erected either side of existing pedestrian path. Site separation from pedestrian route.

- **Pedestrian Path Maintained**
  Existing pedestrian route shall Be maintained from train station to Green Ave. Shielded from construction works by site Fencing / Hoarding.
  Path shall only have a minor adjustment, preventing pedestrians from walking south towards carpark.

- **Site Entry Point**
  shall be Northern access ramp.

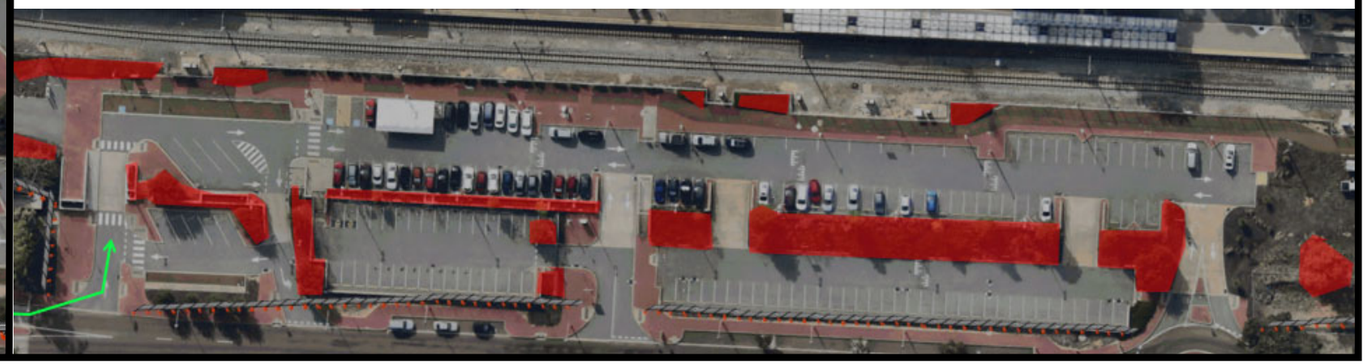
Extent of Planned Works – PTA Boundary – – – – –

A large number of Pile locations sit along the PTA boundary fence. The following are a number of considerations that will need to be addressed if these piles are to be achieved outside of the possession period.

1. Pile clashes with existing PTA underground service assets (**DIRECT CLASH**)
2. Piling works within proximity of PTA equipment – requiring modification to box footings / vibration consideration (**INDIRECT CLASH**)
3. Piling Operation within proximity of live rail diesel track. Pile hole will be within 2.5 meters of track and within 1.25m of ballast edge. Impact of train activity vibration and weight of passing train on the bore should be considered.

Carpark Zone – Tree Relocation / Removal

- **Tree Removal / Relocation**
  Carpark zone is currently accessible to commence tree relocation / removal from all highlighted beds.
  Tree removal works should commence early 2023 to allow for commencement of crane pads / demolition.

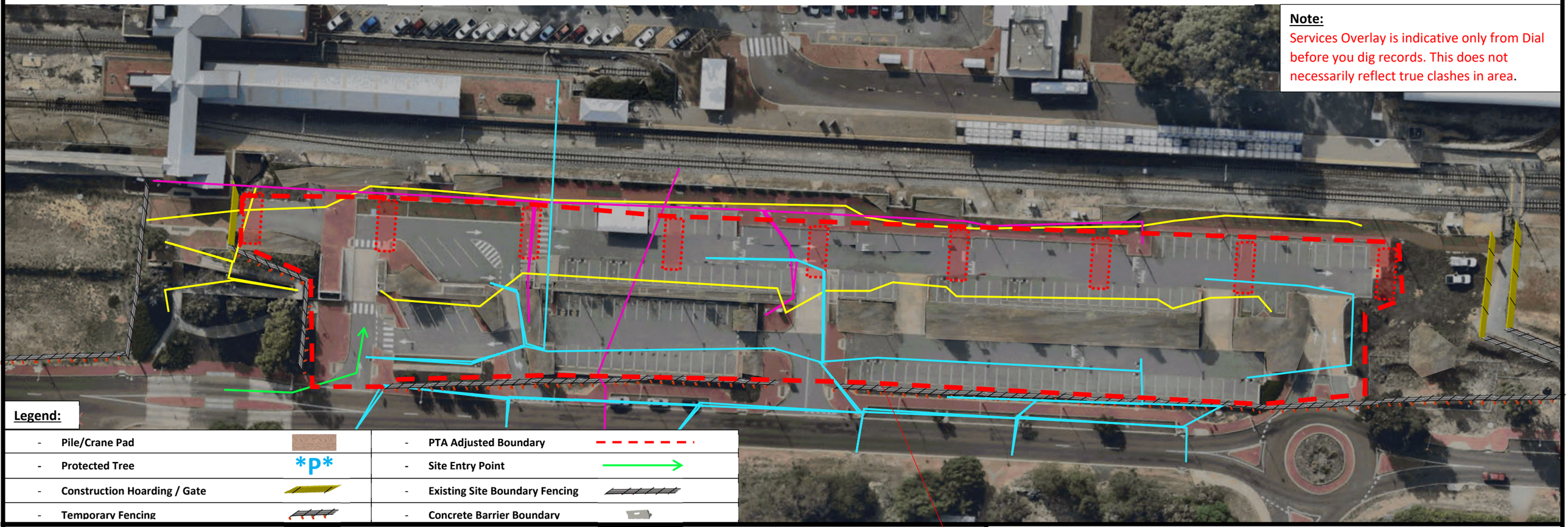


GREEN AVENUE CAR PARK EARLY WORKS – Pile Preparation Works (Stage 2)
(Removal of Asphalt at Pile Locations / Service Management & Diversions)

Construction Staging – Concept
Aston Williams

MetCONNX

Note:
Services Overlay is indicative only from Dial before you dig records. This does not necessarily reflect true clashes in area.



Legend:

-	Pile/Crane Pad	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Northern Zone – Unique Detail:

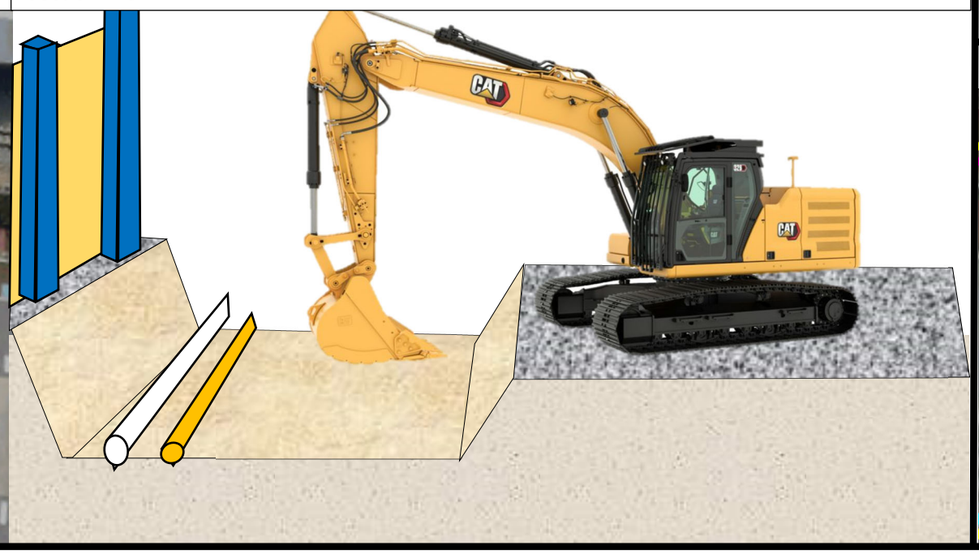
The existing level at the Northern end of carpark is approximately 1.85m higher than current design pile cut-off level (This should be checked again with IFC design)

Based on this – road and ground within this zone will need to be demolished and excavated down to pile level.

- All services to be uncovered and bundled / protected (After excavation)
- Hoarding / Fencing design and position In this zone to consider the excavation activity

Plan View:

Section View:

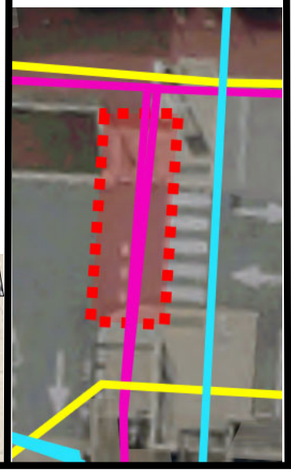


Carpark Zone – Asphalt Removal & Clash Modification

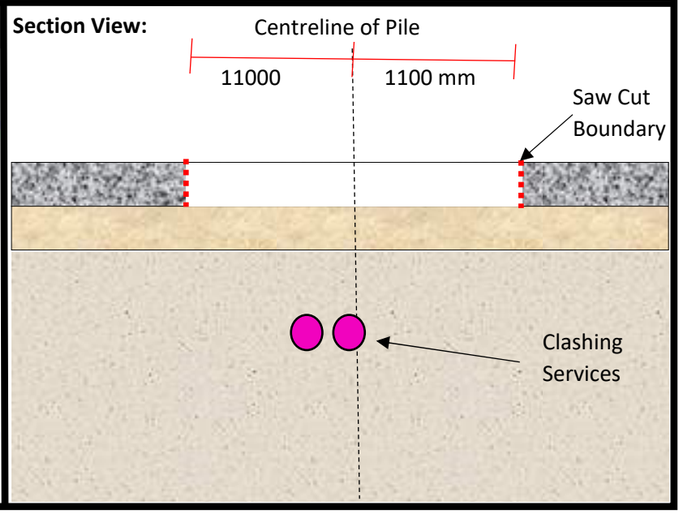
- Demolition contractor shall **Saw cut** through road surface layer
- Hand dig / Non-destructive dig to expose any services clashing with pile location
- Relocate / Adjust service position to avoid pile works clash

Note: Demolition of entire carpark to occur at this stage of works.

Plan View:



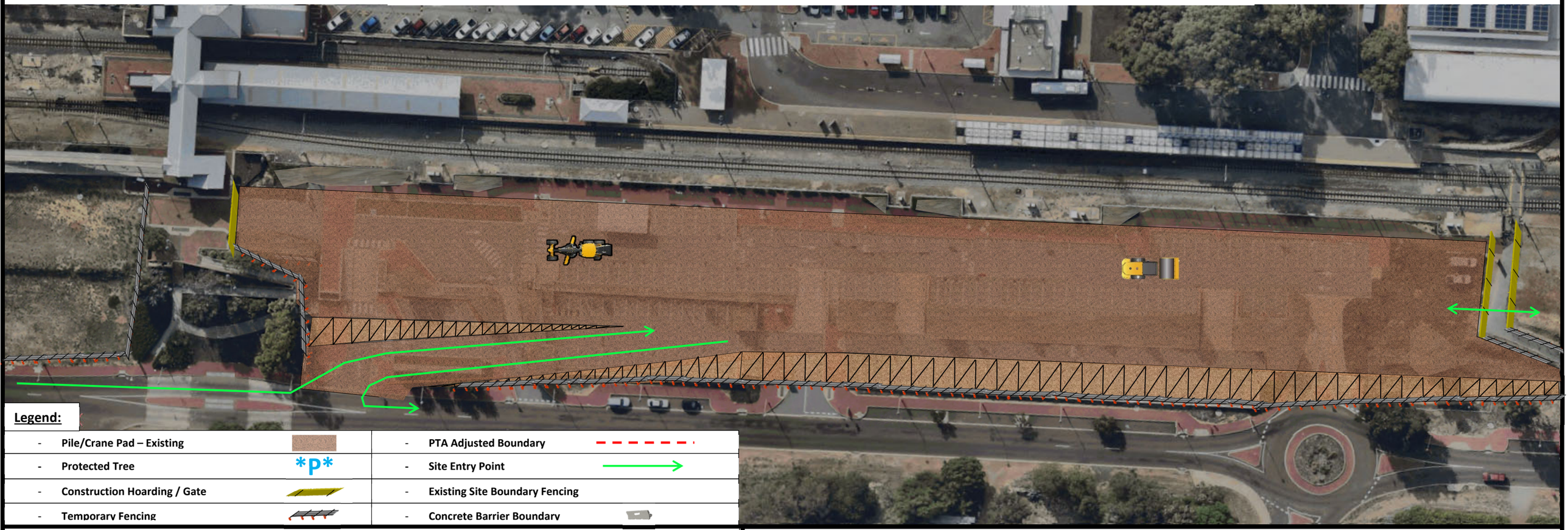
Section View:



GREEN AVENUE CAR PARK EARLY WORKS – Piling / Crane pad (Stage 3)
(Access Ramp / Piling / Crane Pad Construction)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Mobilization of Plant and Materials:

- All plant & material deliveries shall occur via the Green Avenue main site access gate or via the Church Street site and transported through the temporary hoarding gates at southern end of carpark.

Services Relocation / Protection:

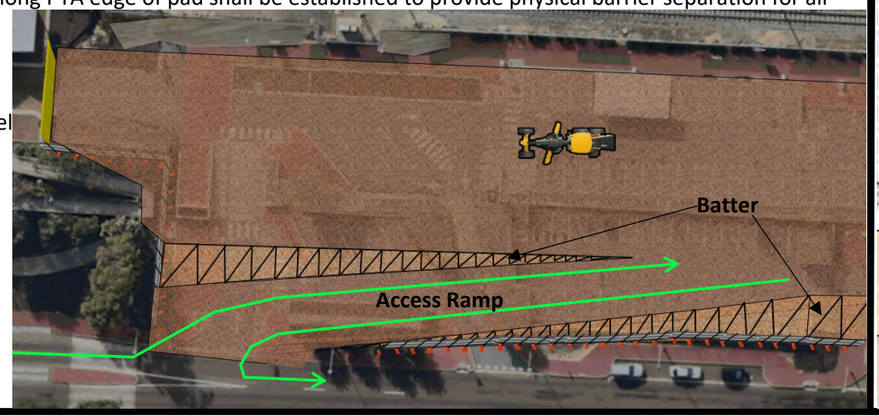
- Services assessment shall take place as part of the crane pad design to determine extent of protection to be put in place.
- All existing drainage services shall be adequately sealed to prevent wash off from the pad which will be built above them from blocking / entering the drainage pipes.
- Any additional service protection required based on design assessment shall be put in place at time of pad Construction.

Pad / Access Ramp Construction

- Build-up of limestone material along PTA edge of pad shall be established to provide physical barrier separation for all plant.

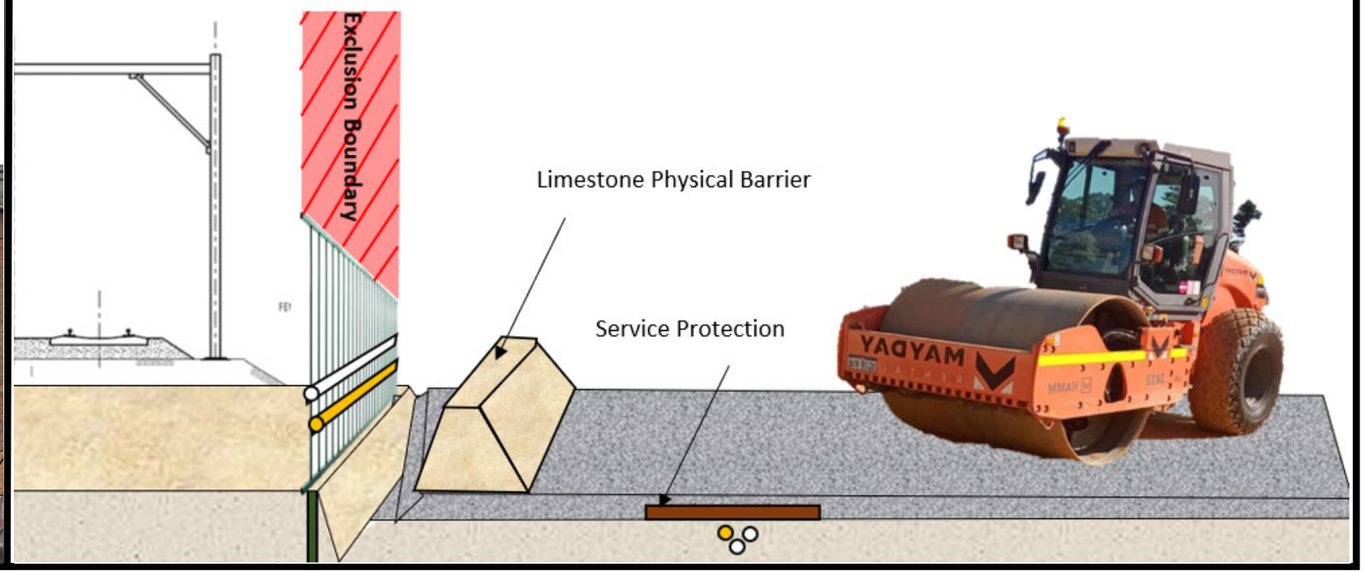
- Access ramp shall be built from Green Ave up to pad surface level

- Lower carparks shall be filled & Raised up to required pad level



Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



GREEN AVENUE CAR PARK EARLY WORKS – Piling Works (Stage 4)
(Pile Construction)

Construction Staging – Concept
Aston Williams

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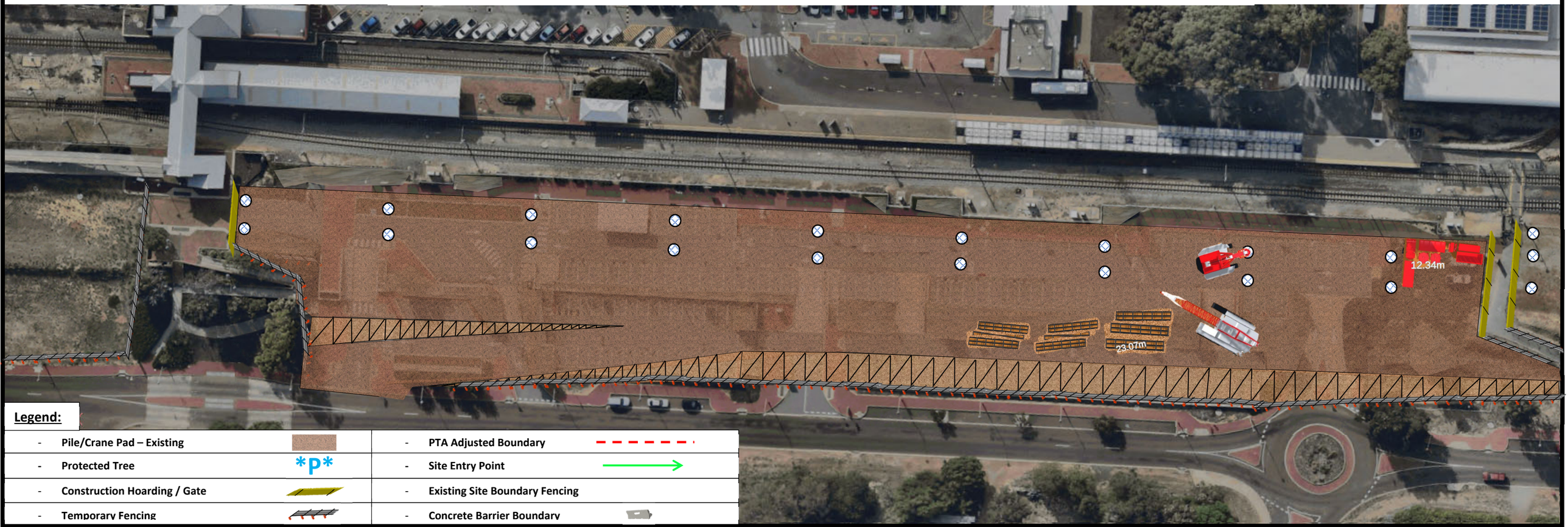


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

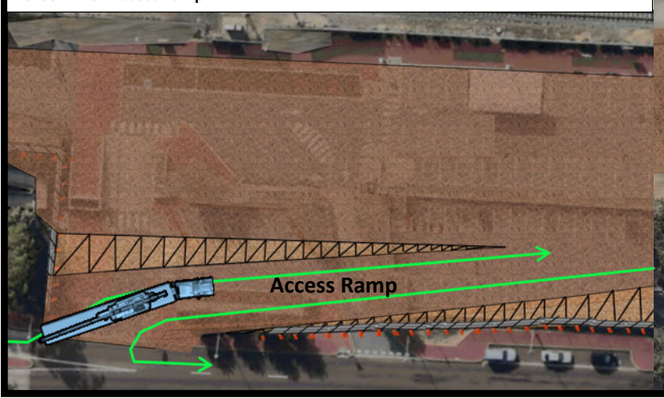
Option 1 – Green Ave Access Ramp

Option 2 – Church Ave Site Gate / Inter-site Movement through Hoarding Gate

- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).

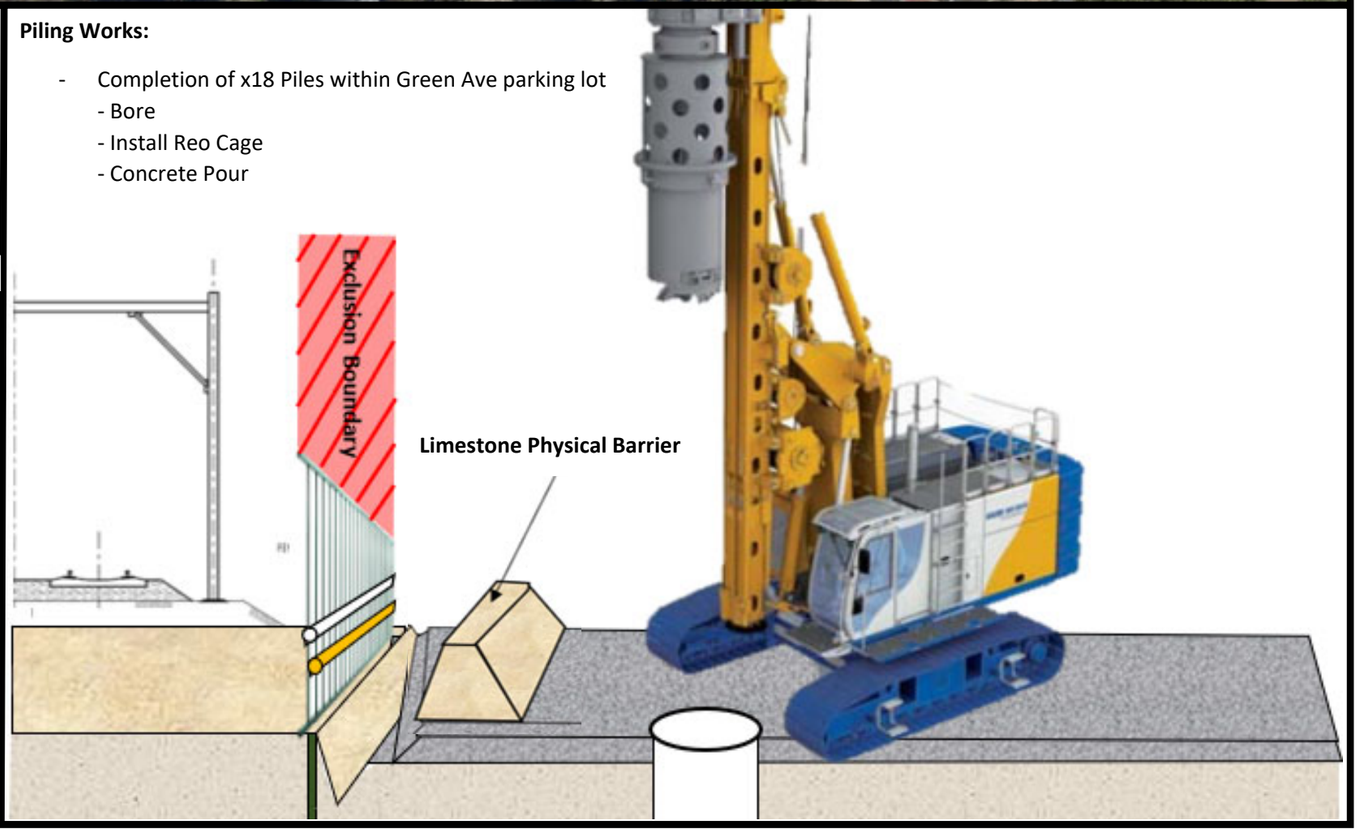
Church Avenue - Gate

Green Ave - Access Ramp



Piling Works:

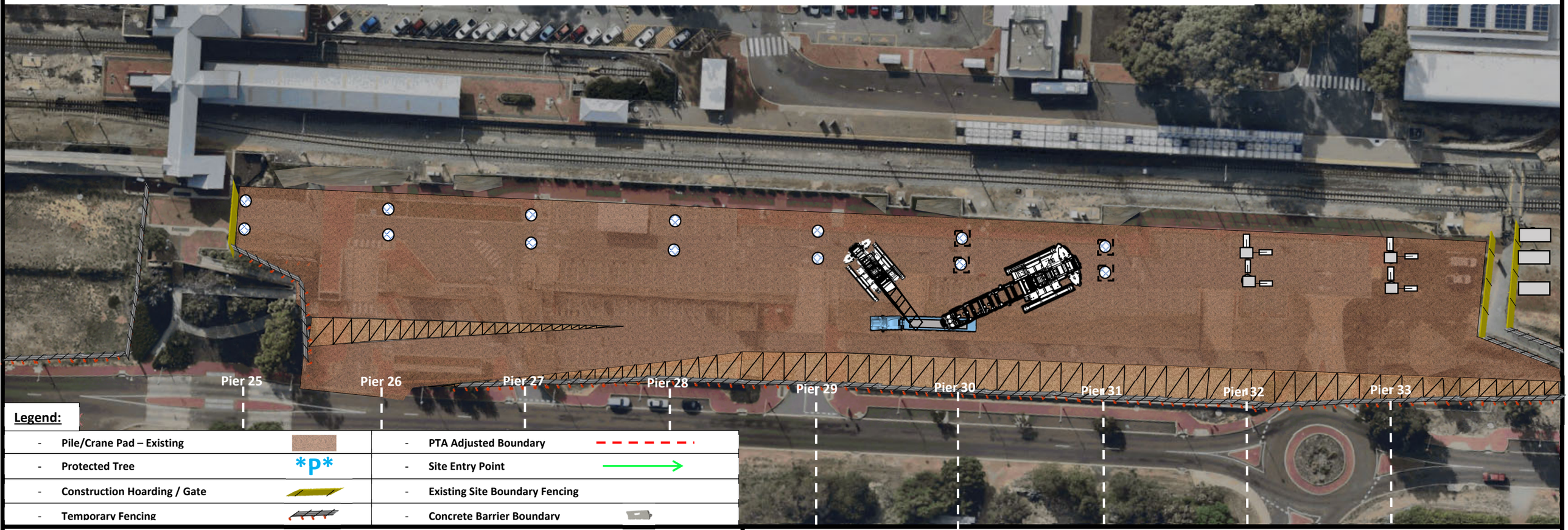
- Completion of x18 Piles within Green Ave parking lot
  - Bore
  - Install Reo Cage
  - Concrete Pour



GREEN AVENUE CAR PARK EARLY WORKS – Pier Install (Stage 5)
(Column Erection / Propping / Grouting)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

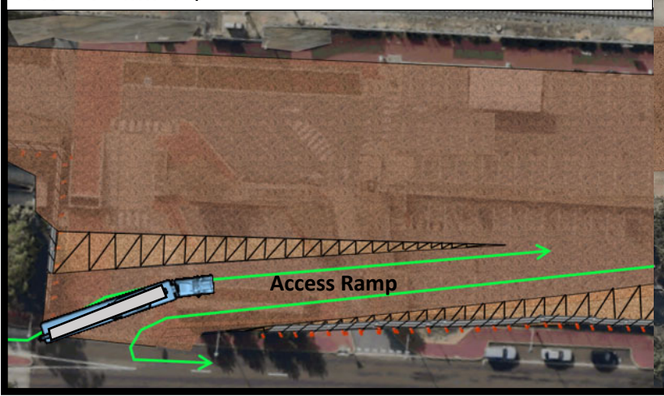
Option 1 – Green Ave Access Ramp

Option 2 – Church Ave Site Gate / Inter-site Movement through Hoarding Gate

- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).

Church Avenue - Gate

Green Ave - Access Ramp

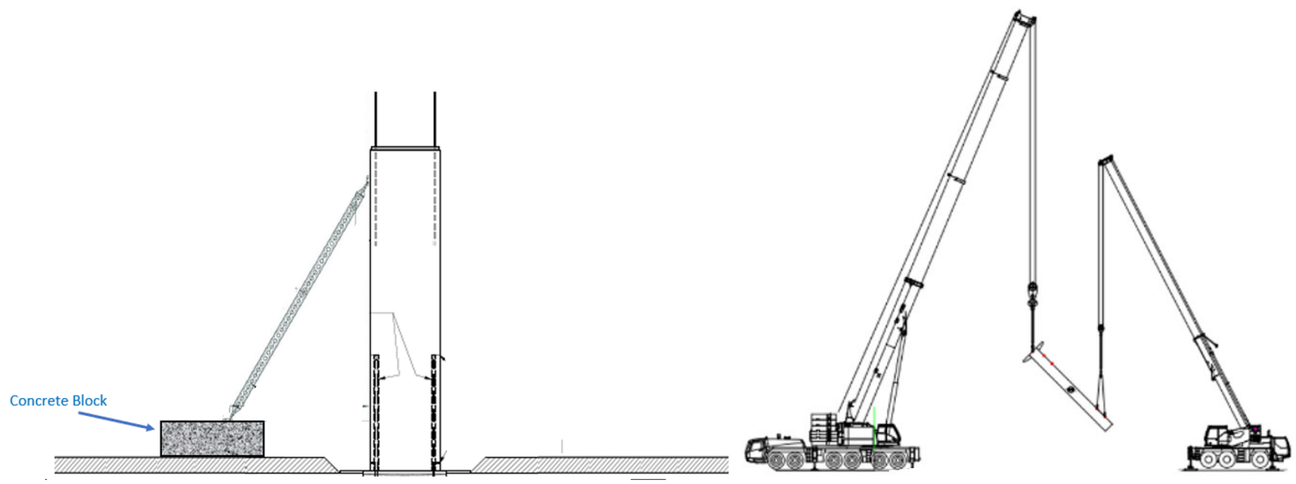


Precast Installation:

Installation of x4 Columns - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage A :

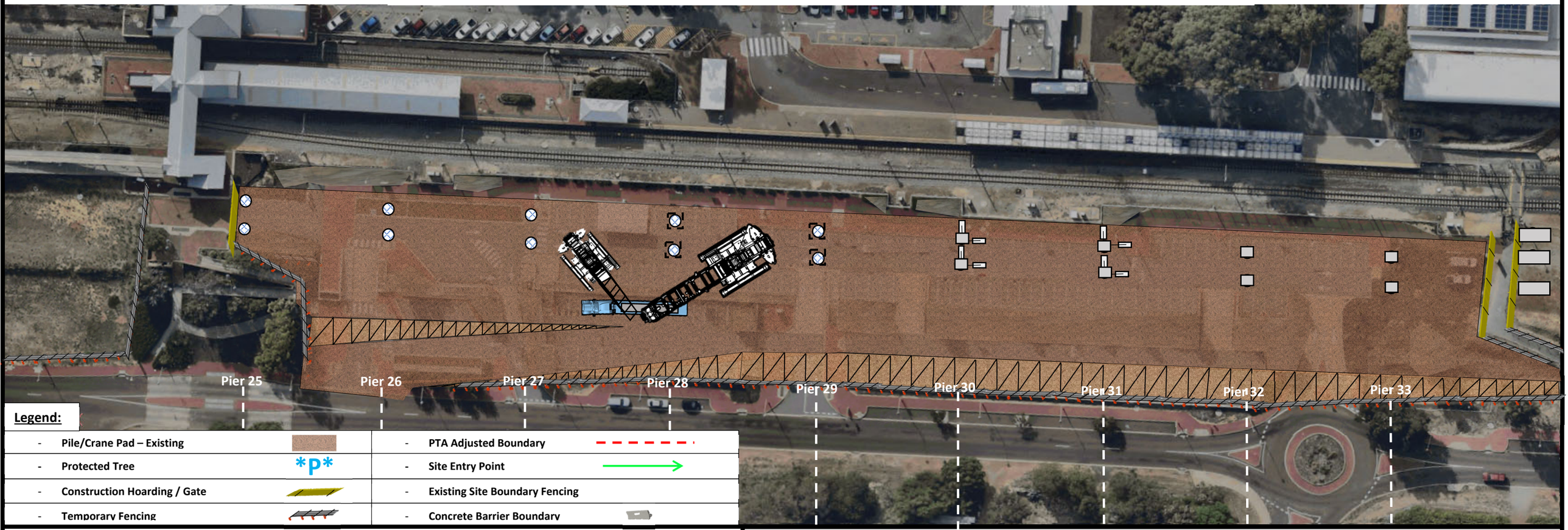
- Install Columns Pier 33 / Pier 32
- Crane relocate at end of shift to next bay
- Grouting to occur for all columns in bay 33/32 following install - To allow Headstock Stage To Commence
- Install Columns Pier 31 / Pier 30



GREEN AVENUE CAR PARK EARLY WORKS – Pier Install (Stage 6)
(Column Erection / Propping / Grouting)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

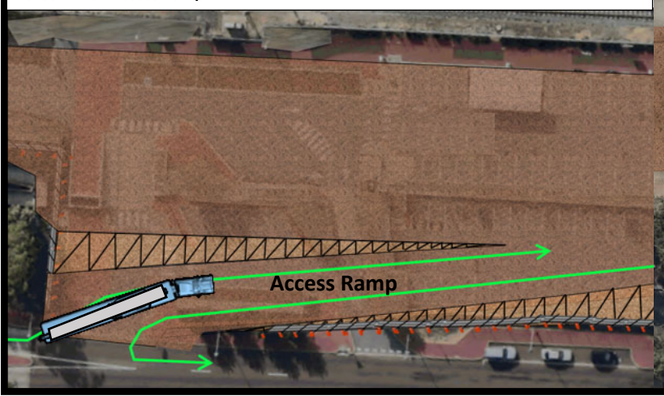
Option 1 – Green Ave Access Ramp

Option 2 – Church Ave Site Gate / Inter-site Movement through Hoarding Gate

- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).

Church Avenue - Gate

Green Ave - Access Ramp

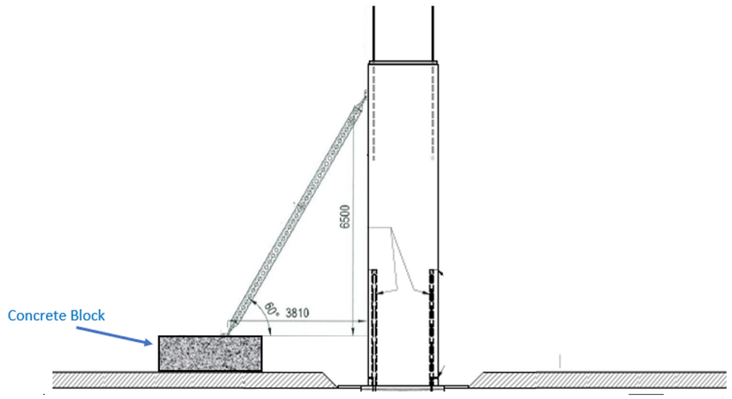


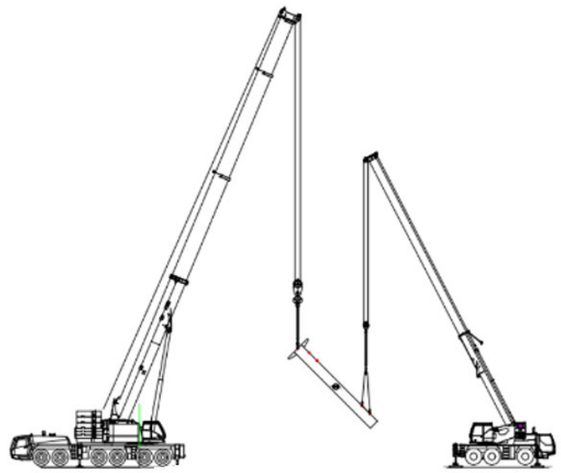
Precast Installation:

Installation of x4 Columns - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage B :

- Install Columns Pier 28 / Pier 39
- Grouting to occur for all columns in bay 30/31 - To allow Headstock Stage To Commence
- Columns in bay 32/33 checked for strength and verified for headstock loading
- Crane relocates to bay 33/32 at end of shift





Construction Staging – Concept
Aston Williams

ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 7)
(Western Precast Installation / Eastern Rail Removal & Station Demolition)

MetCONNX

Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Rail Demolition:

NOTE: Rail and Sleepers can be removed from bridge structure – but the bridge structure must remain

- Decommission / Remove all Rail Electrical / Coms Assets

- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

- Partial removal of pedestrian pathway is required within design. Either demolish entire pathway at this stage or crane pad will be built over it, requiring it to be exposed and demolished at a later stage.

Below Ground Service Activities:

- CIVLS / services team to complete any service relocations / modifications within this zone

- Any services which remain or are newly placed should have a service protection detail / plan incorporated within the temporary works design.

Geotechnical Testing:

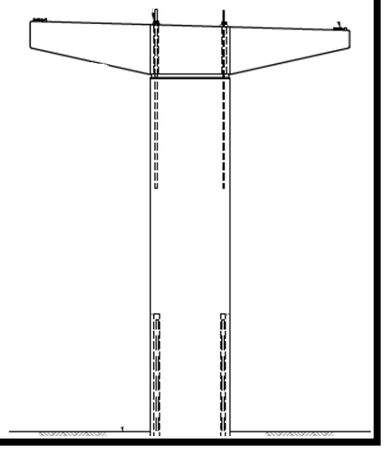
- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

Precast Installation:

Installation of x4 Headstocks -
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage C :

- Install Headstocks Pier 33 / Pier 32
- Grouting to occur for all columns in bay 28/29 - To allow Headstock Stage To Commence
- Columns in bay 30/31 checked for strength and verified for headstock loading
- Crane to relocate to bay 30/31 at the end of shift



Construction Staging – Concept
Aston Williams

ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 8)
(Western Precast Installation / Station Demolition - South)

MetCONNX

Legend:

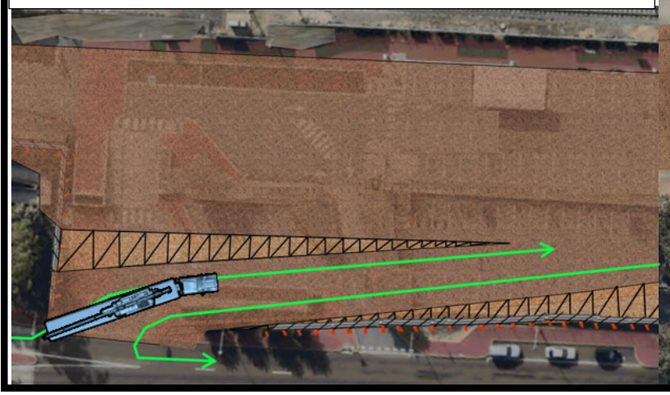
-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

Option 1 – Green Ave Access Ramp

Option 2 – Church Ave Site Gate / Inter-site Movement through Hoarding Gate

Green Ave - Access Ramp



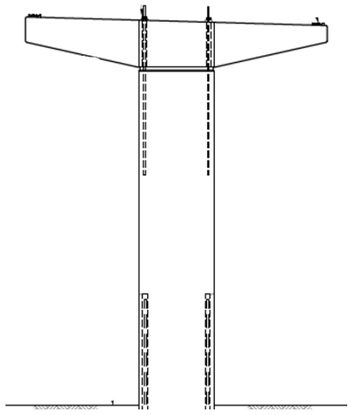
Church Avenue - Gate

Precast Installation:

Installation of x4 Headstocks -
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage D :

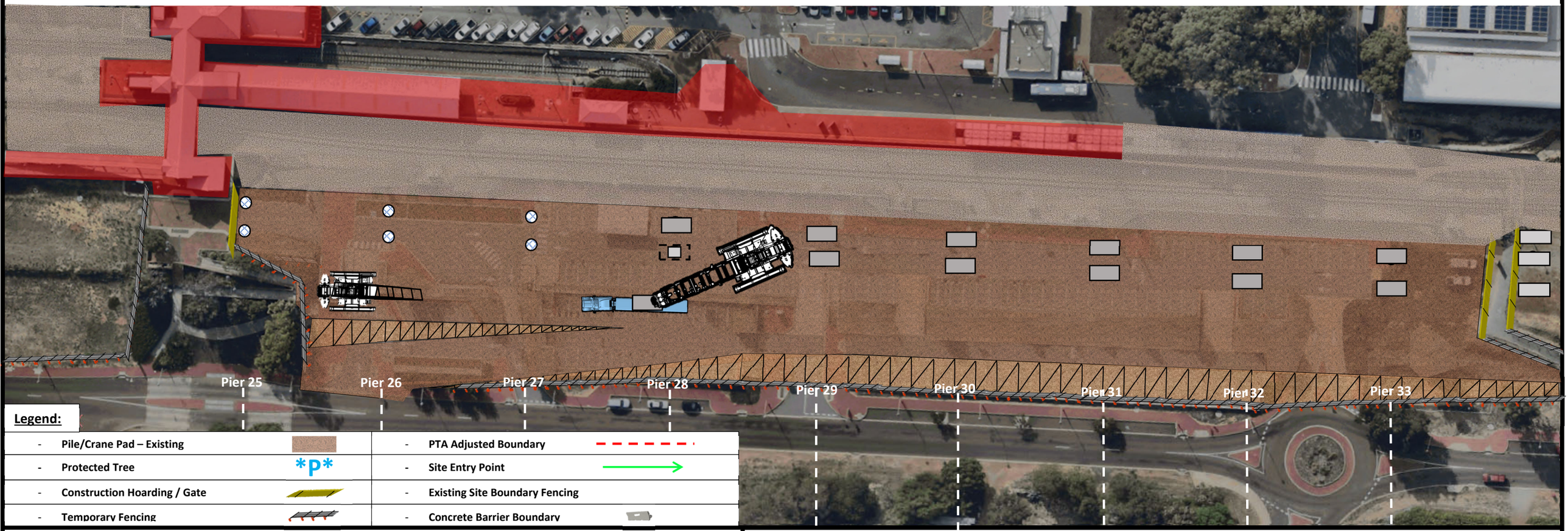
- Install Headstocks Pier 30 / Pier 31
- Columns in bay 28/29 checked for strength and verified for headstock loading
- Headstock reo/concrete permanent connection to be completed Piers 32/33
- Crane to relocate to bay 28/29 at the end of shift



ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 9)
(Western Precast Installation / Station Demolition - South)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

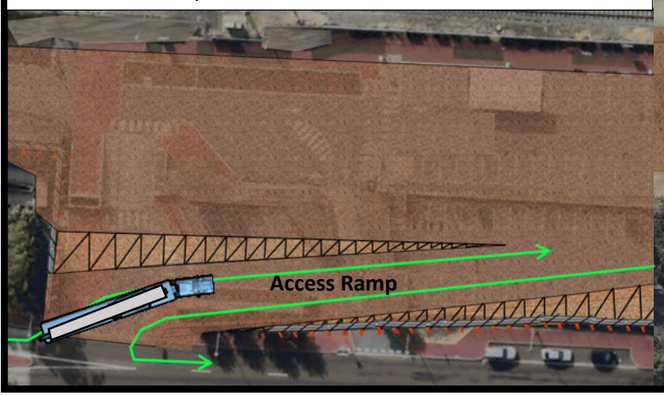
Option 1 – Green Ave Access Ramp

Option 2 – Church Ave Site Gate / Inter-site Movement through Hoarding Gate

- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).

Church Avenue - Gate

Green Ave - Access Ramp

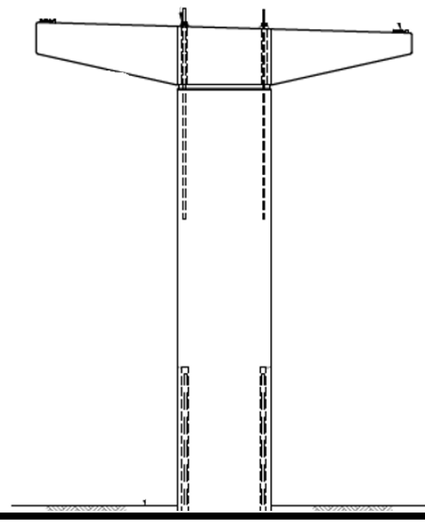


Precast Installation:

Installation of x4 Headstocks -
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage E :

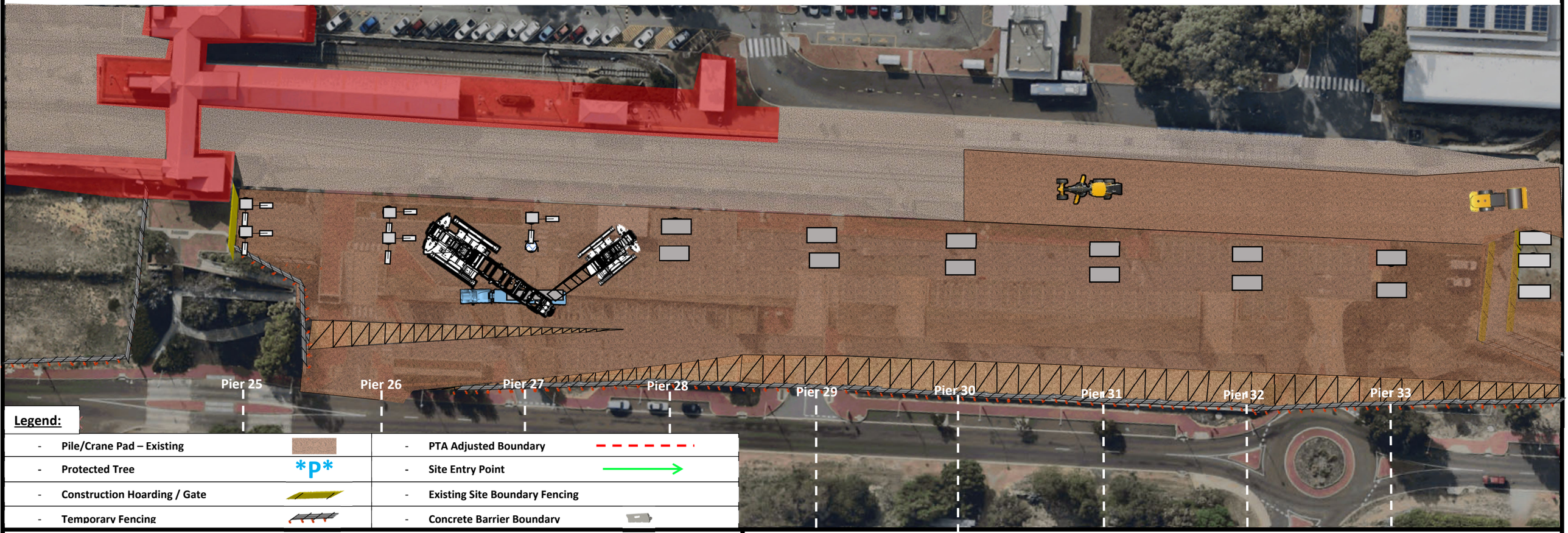
- Install Headstocks Pier 28 / Pier 29
- Headstocks in Bay 32-34 to be checked for strength - To allow Beam Install
- Headstock reo/concrete permanent connection to be completed Piers 30/31
- Crane to relocate to bay 25/26 at the end of shift



ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 10)
(Western Precast Installation / Station Demolition – South/ Pile Pad Construction)

Construction Staging – Concept
Aston Williams

MetCONNX

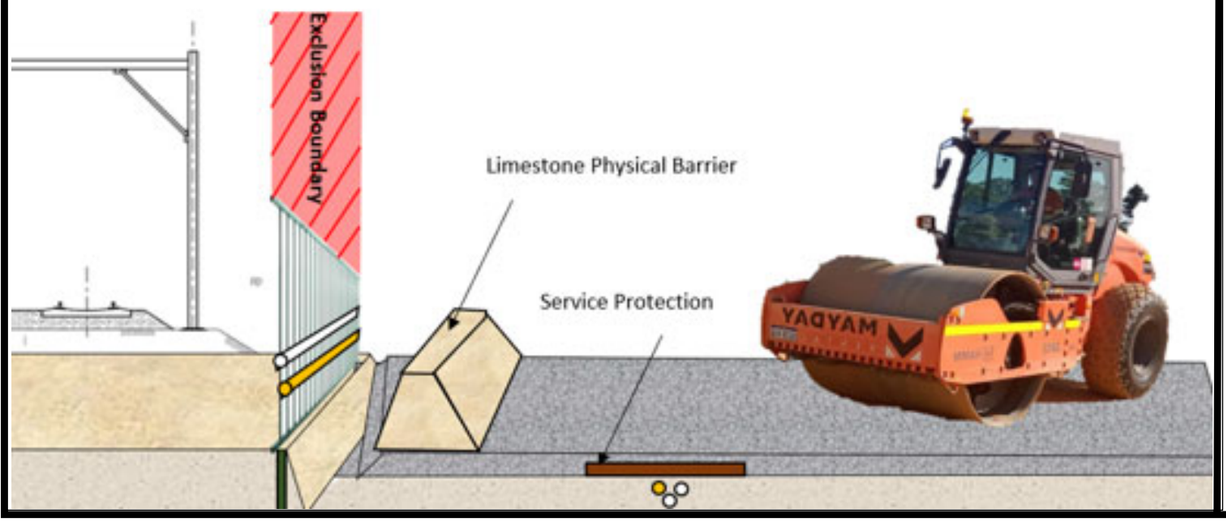


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.

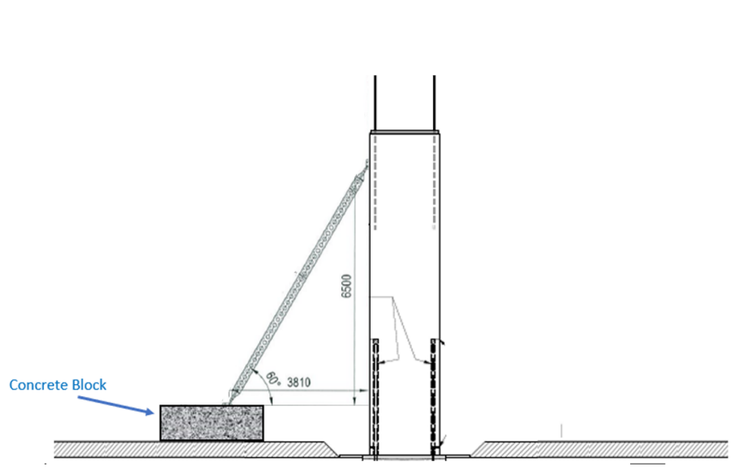


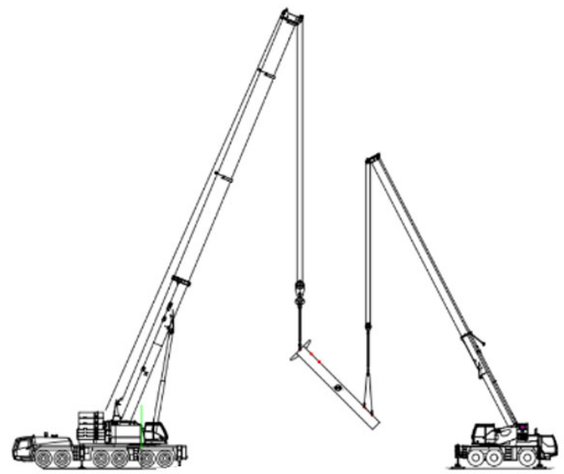
Precast Installation:

Installation of x6 Piers -
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

Stage F :

- Install Columns Pier 25 / Pier 26
- Install Columns Pier 27
- Crane to relocate to bay 33-34 at the end of shift to commence beam install

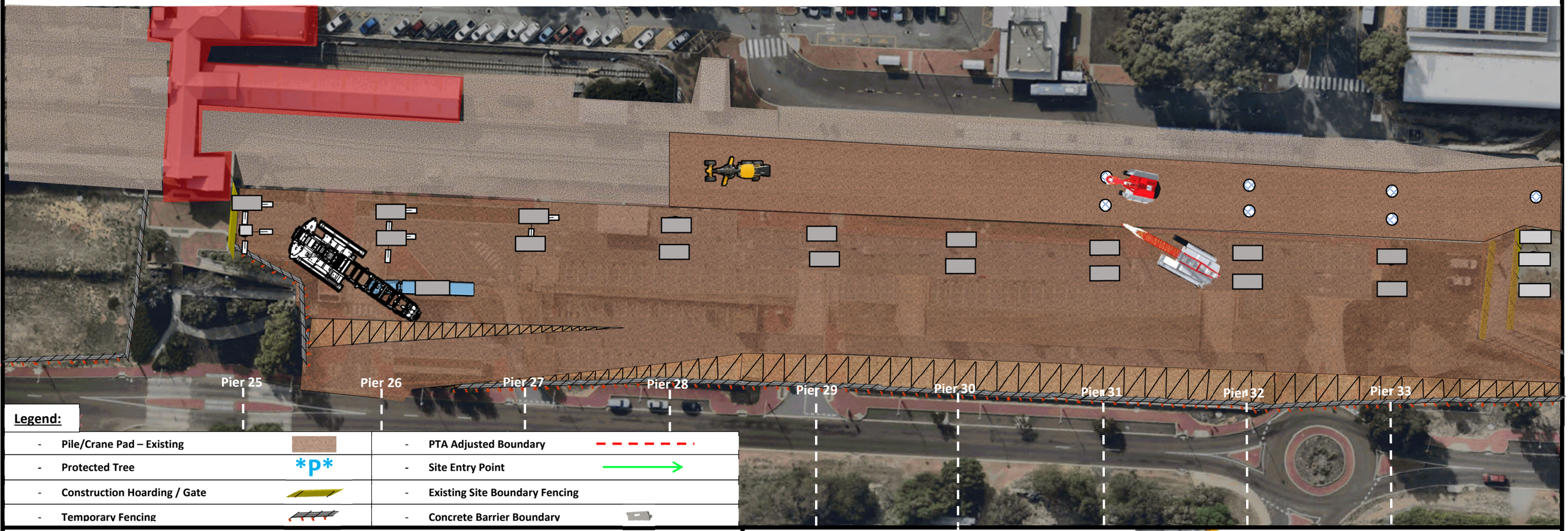




ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 11)
(Western Precast Installation / Station Demolition – Pile Pad Construction)

Construction Staging – Concept
Aston Williams

MetCONNX

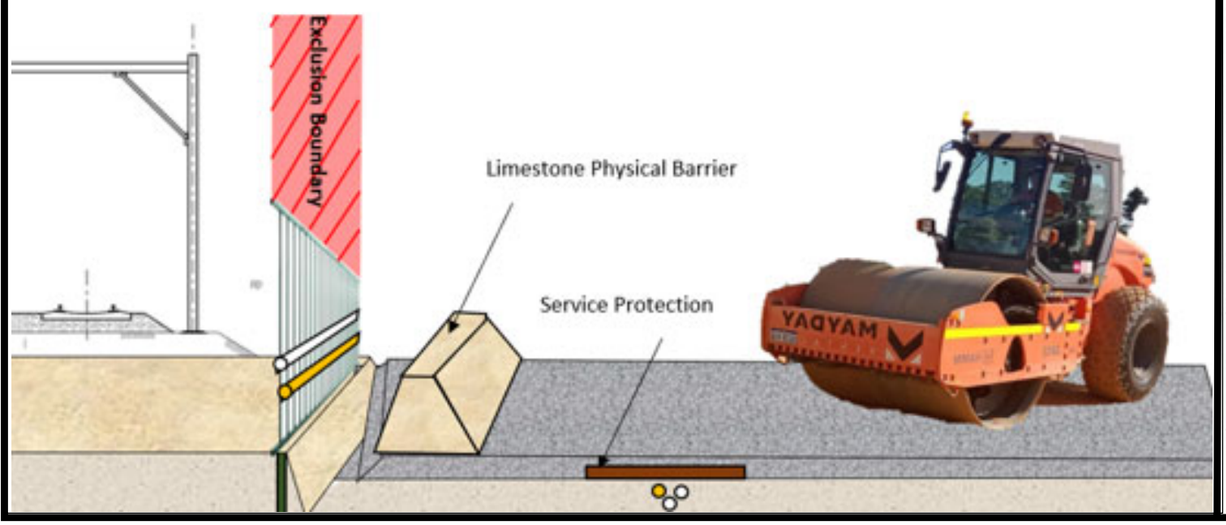


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

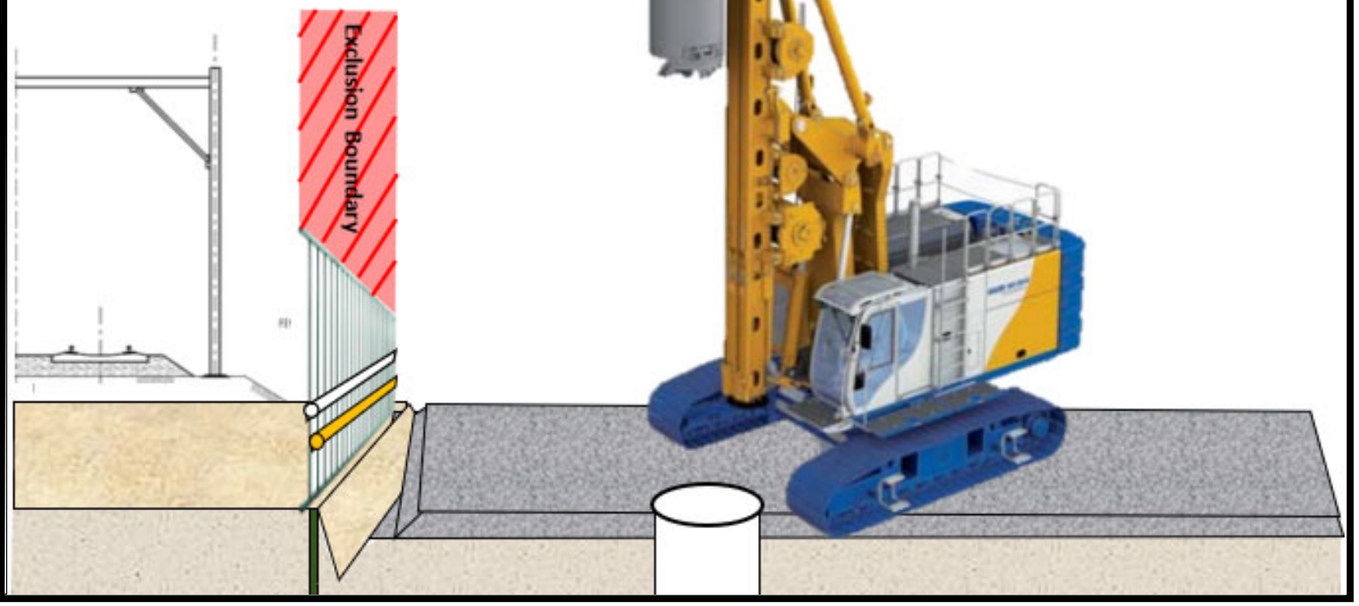
Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



Piling Works:

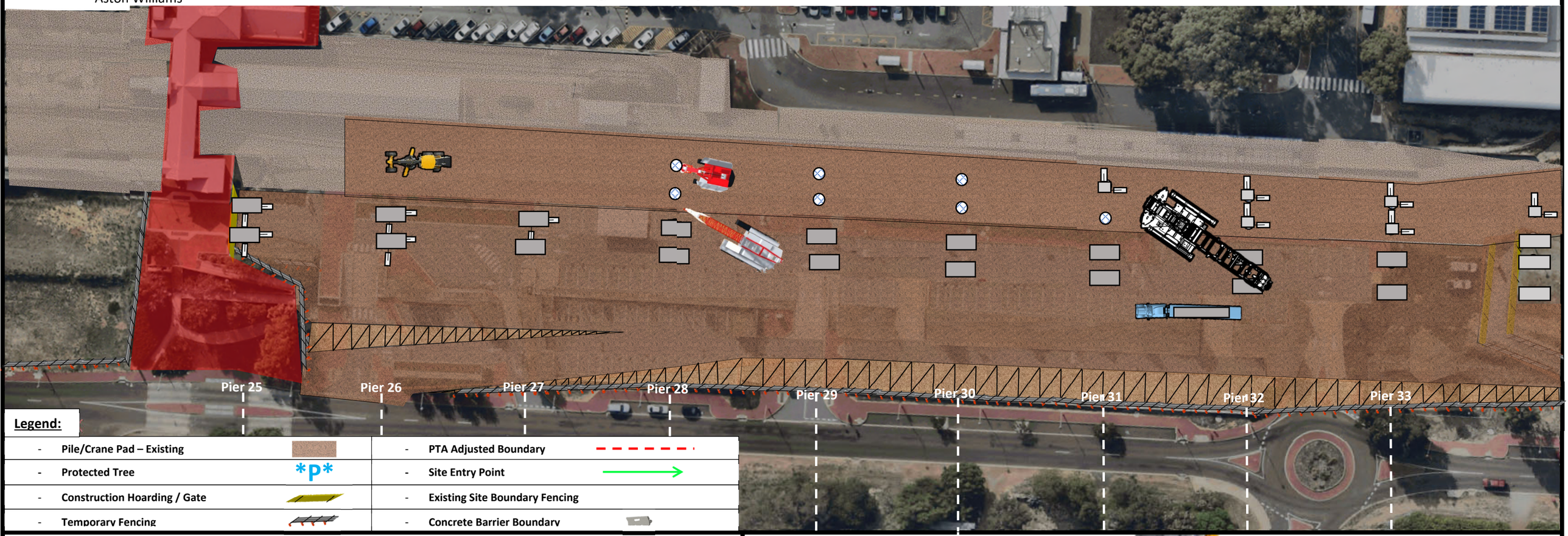
- Completion of x8 Piles
  - Bore
  - Install Reo Cage
  - Concrete Pour



ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 12)
(Eastern Piling Works / Station Demolition – Pile Pad Construction)

Construction Staging – Concept
Aston Williams

MetCONNX

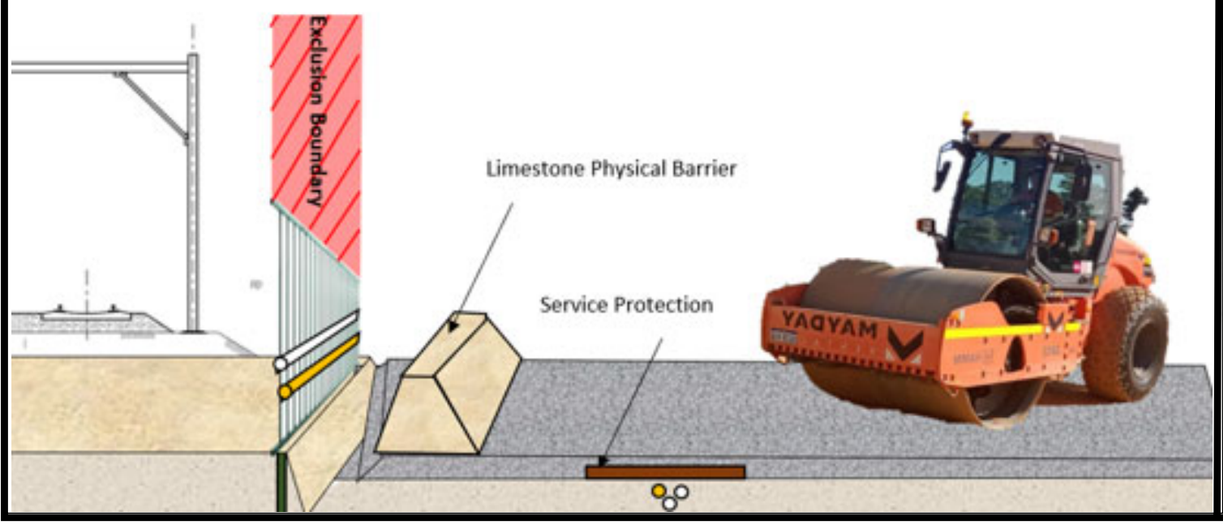


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

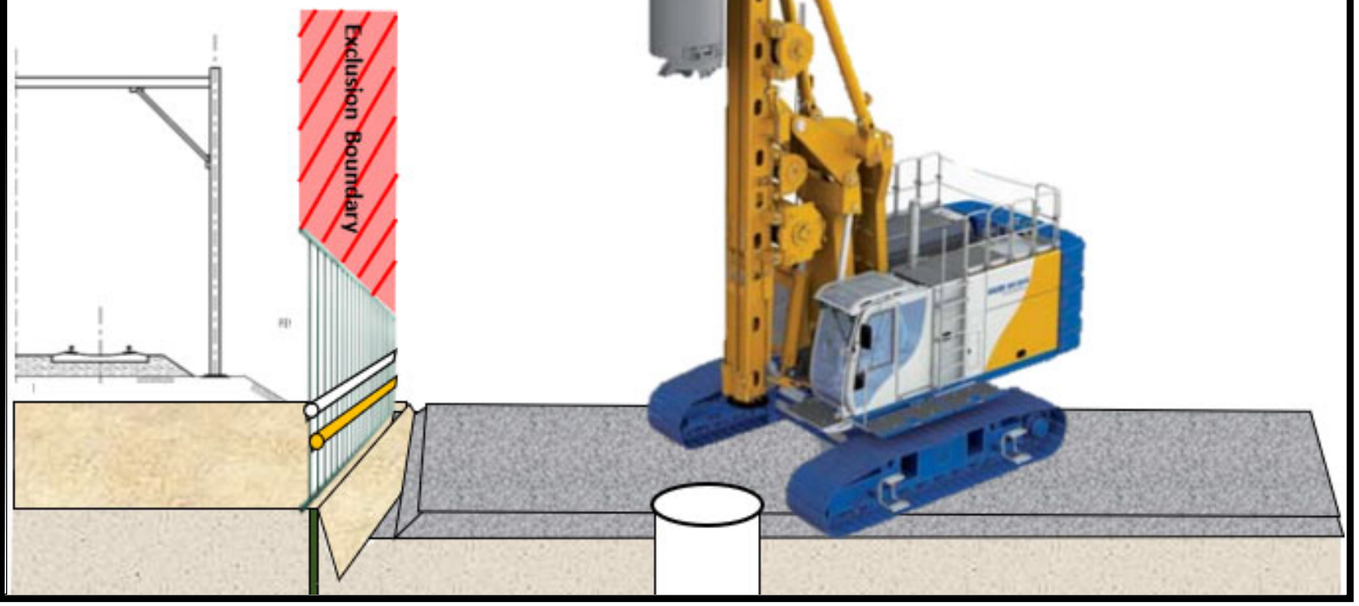
Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



Piling Works:

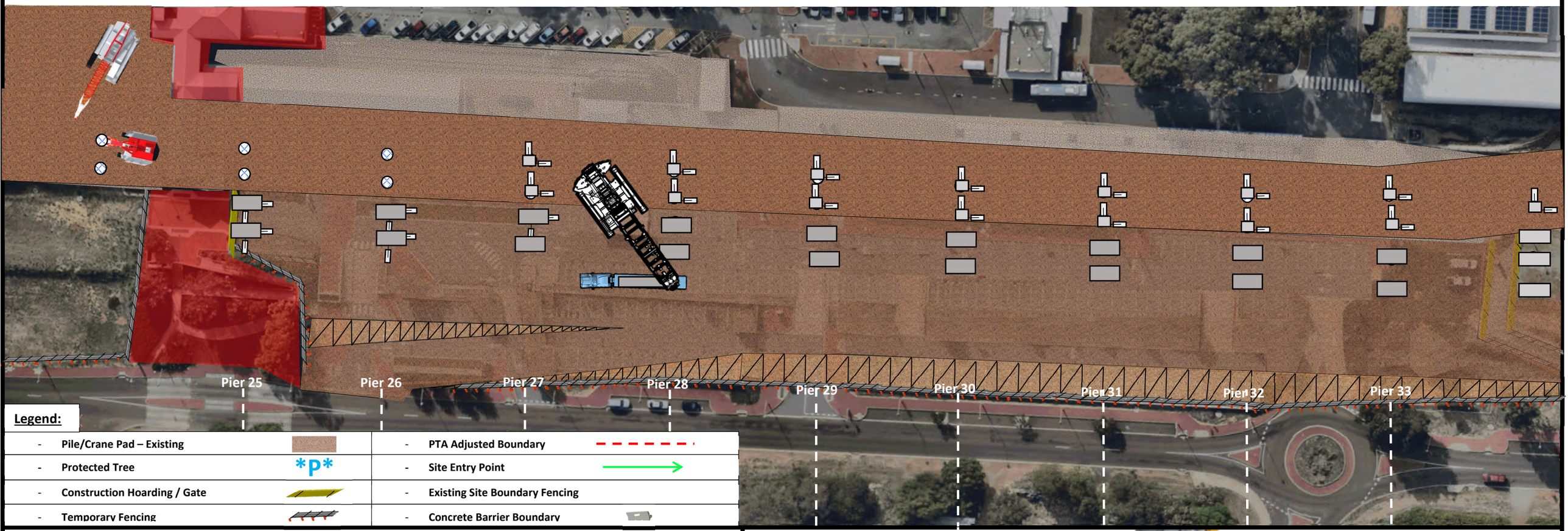
- Completion of x8 Piles
  - Bore
  - Install Reo Cage
  - Concrete Pour



ARMADALE STATION POSSESSION WORKS – West Install / East Demo (Stage 13)
(Eastern Piling Works / Station Demolition – Pile Pad Construction)

Construction Staging – Concept
Aston Williams

MetCONNX

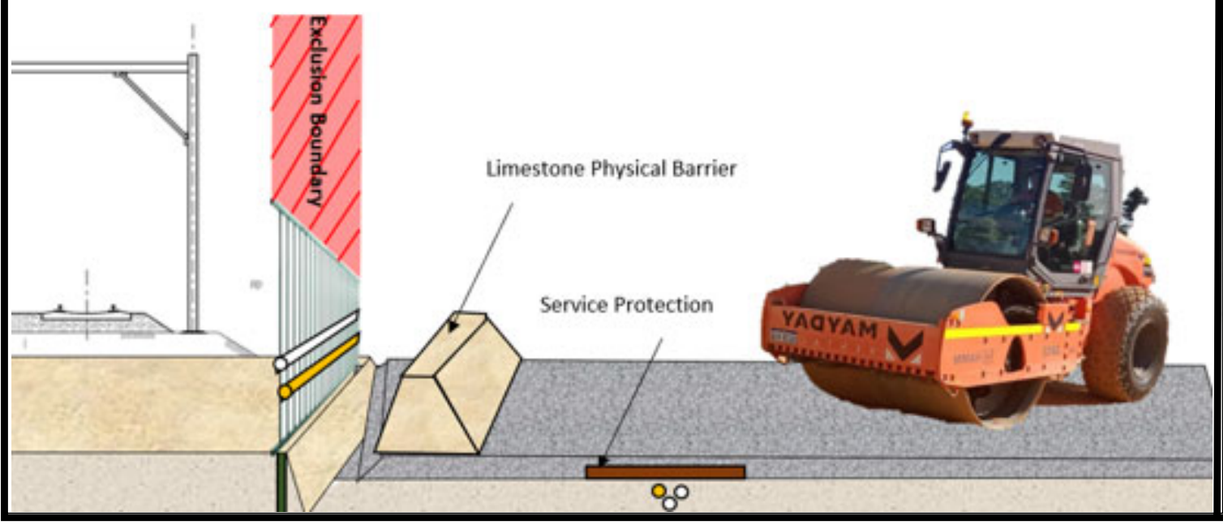


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

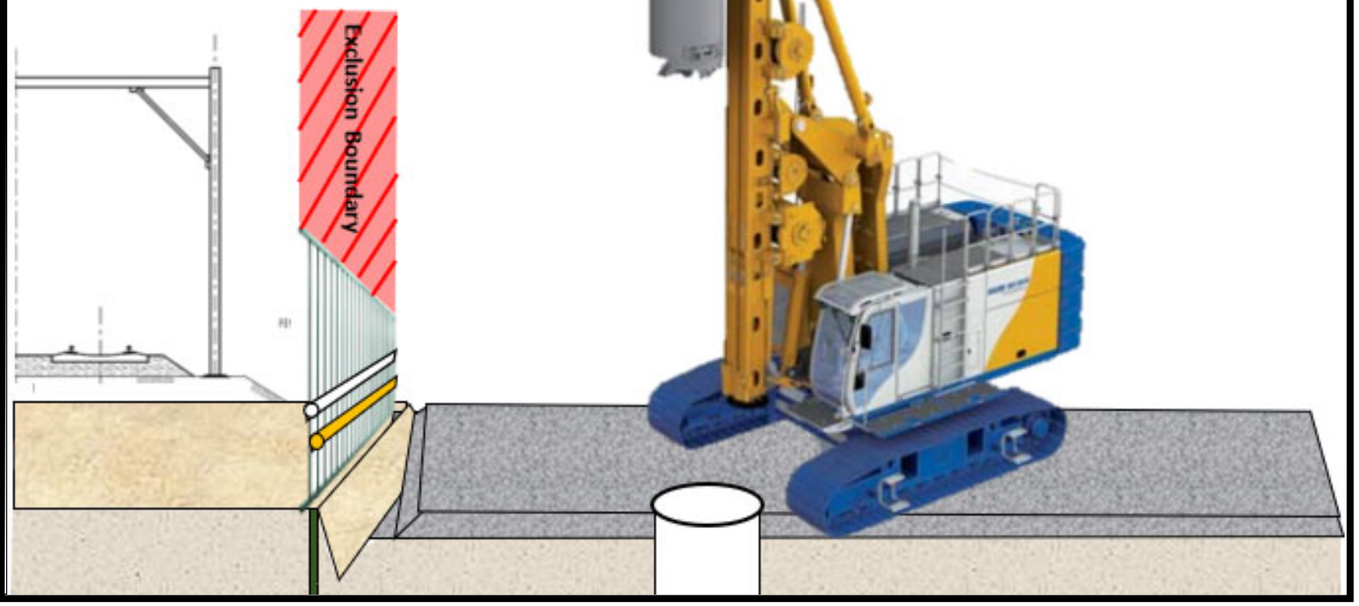
Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



Piling Works:

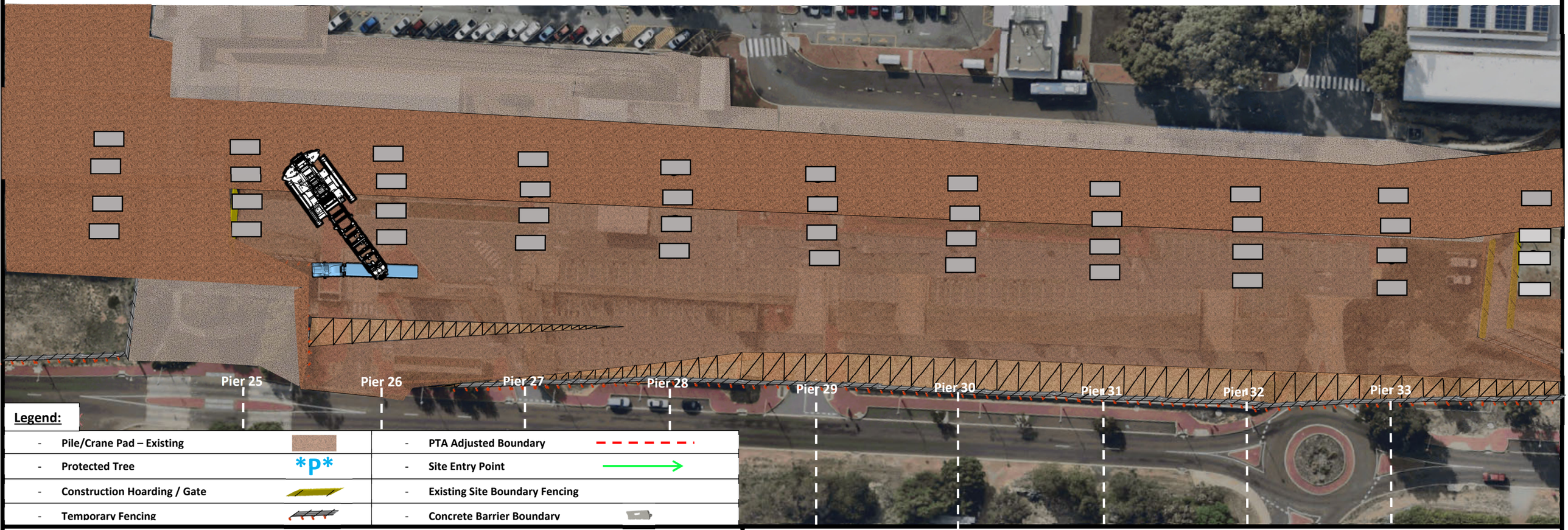
- Completion of x8 Piles
  - Bore
  - Install Reo Cage
  - Concrete Pour



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 14)
(Eastern Precast Installation / Columns & Headstocks)

Construction Staging – Concept
Aston Williams

MetCONNX

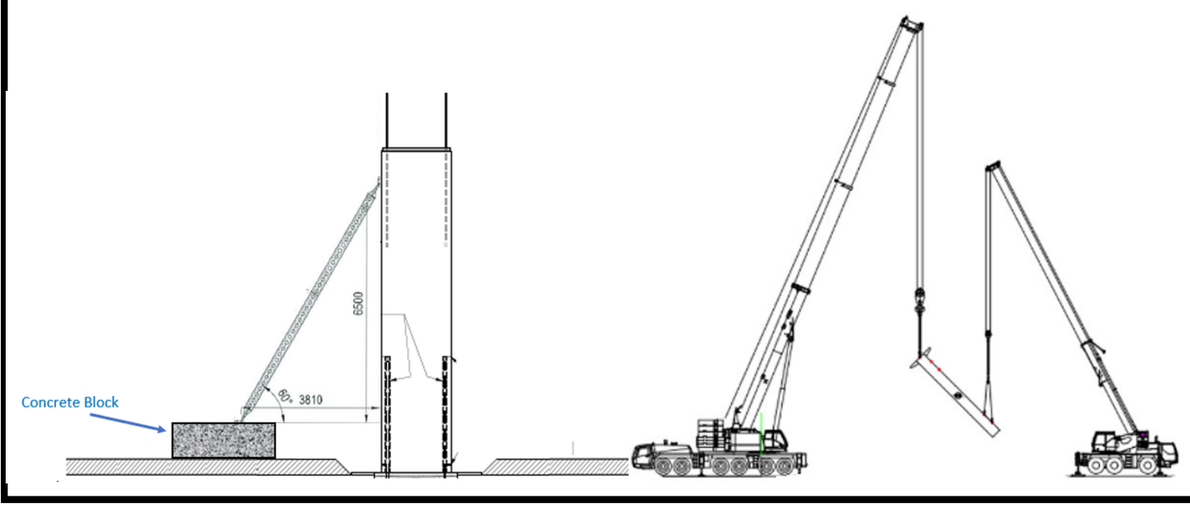


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

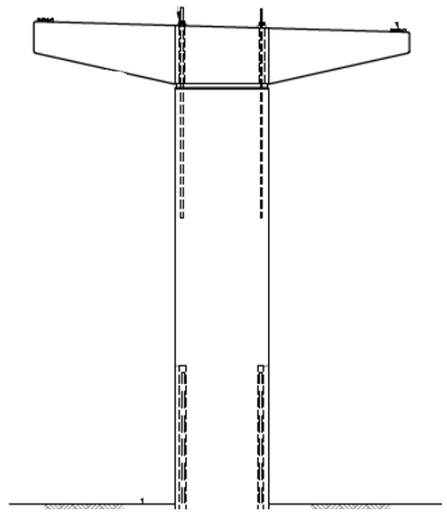
Precast Installation:

Installation of x 20 Columns



Precast Installation:

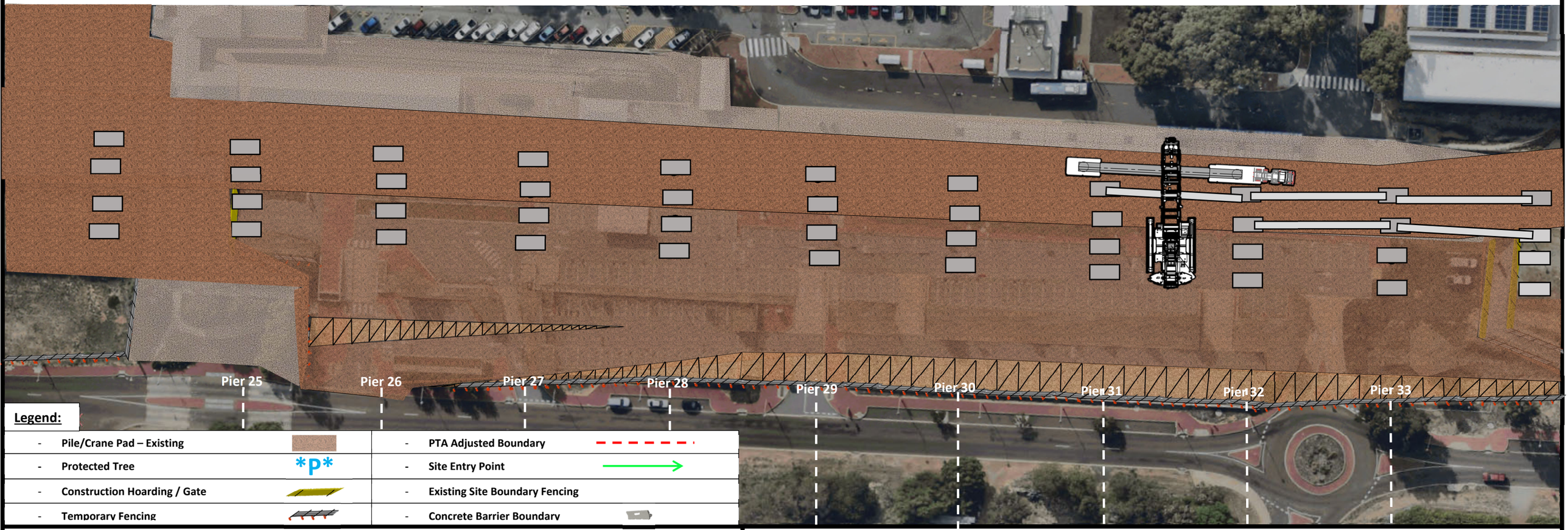
Installation of x20 Headstocks -



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 15)
(Eastern Beam & Plank Installation)

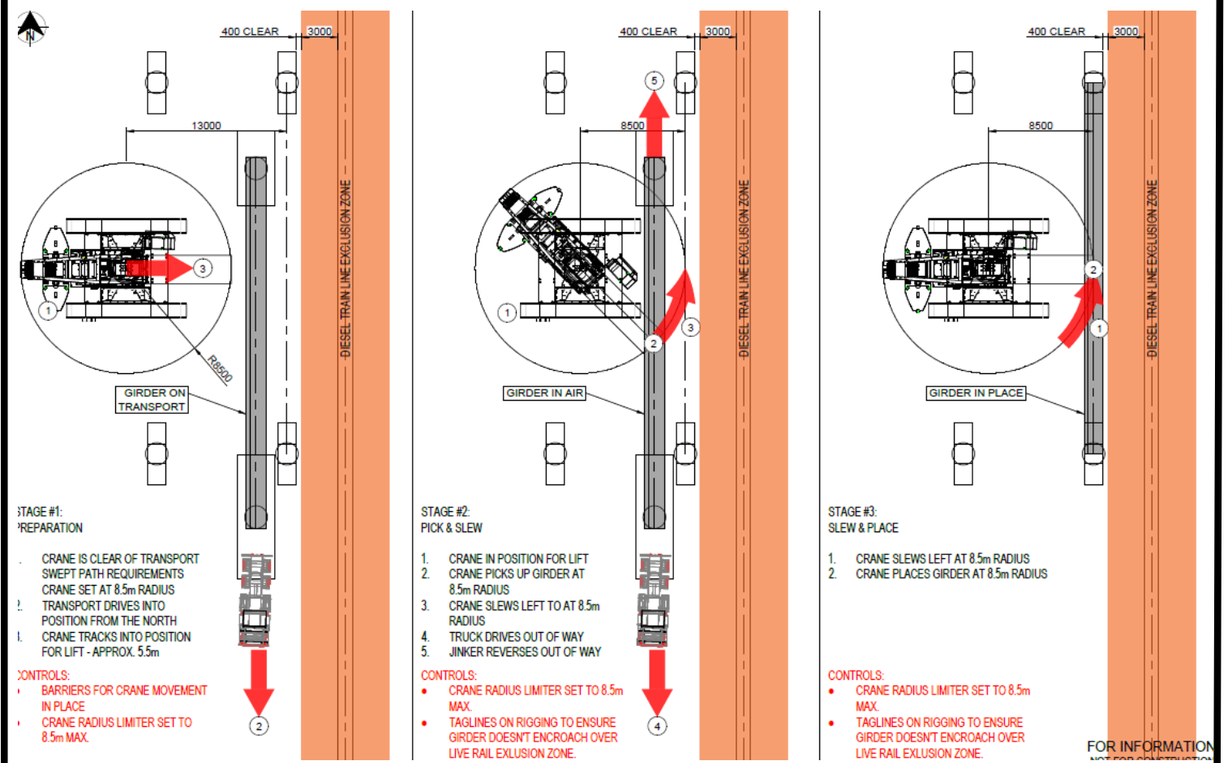
Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary



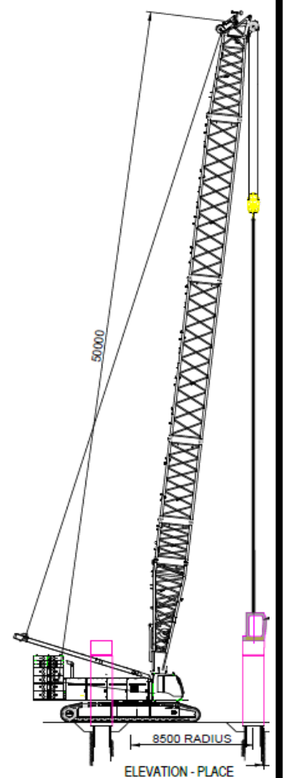
Precast Installation:

Installation of x4 Beams -

- Install Beams Bay 33 / 34 – (BN32-CE = TBC, BN32-E = TBC)

- Install Beams Bay 32 / 33 – (BN32-CE = TBC, BN32-E= TBC)

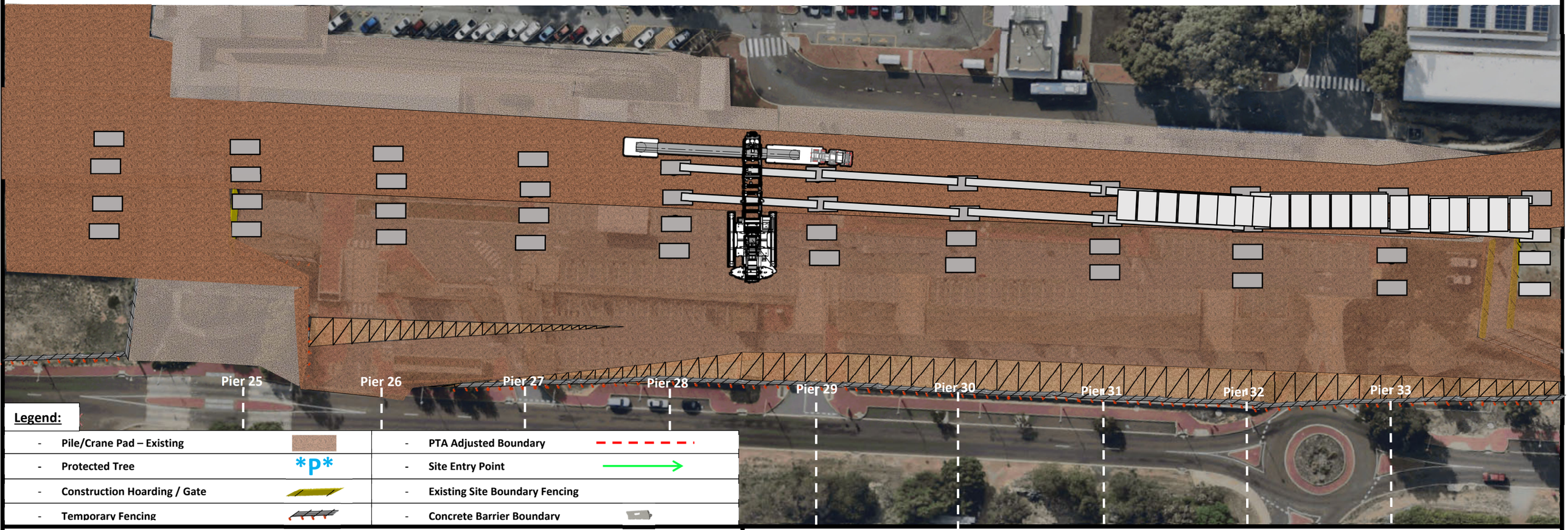
- Install Beams Bay 31 / 32 – (BN31-CE = TBC, BN31-E = TBC)



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 16)
(Eastern Beam & Plank Installation)

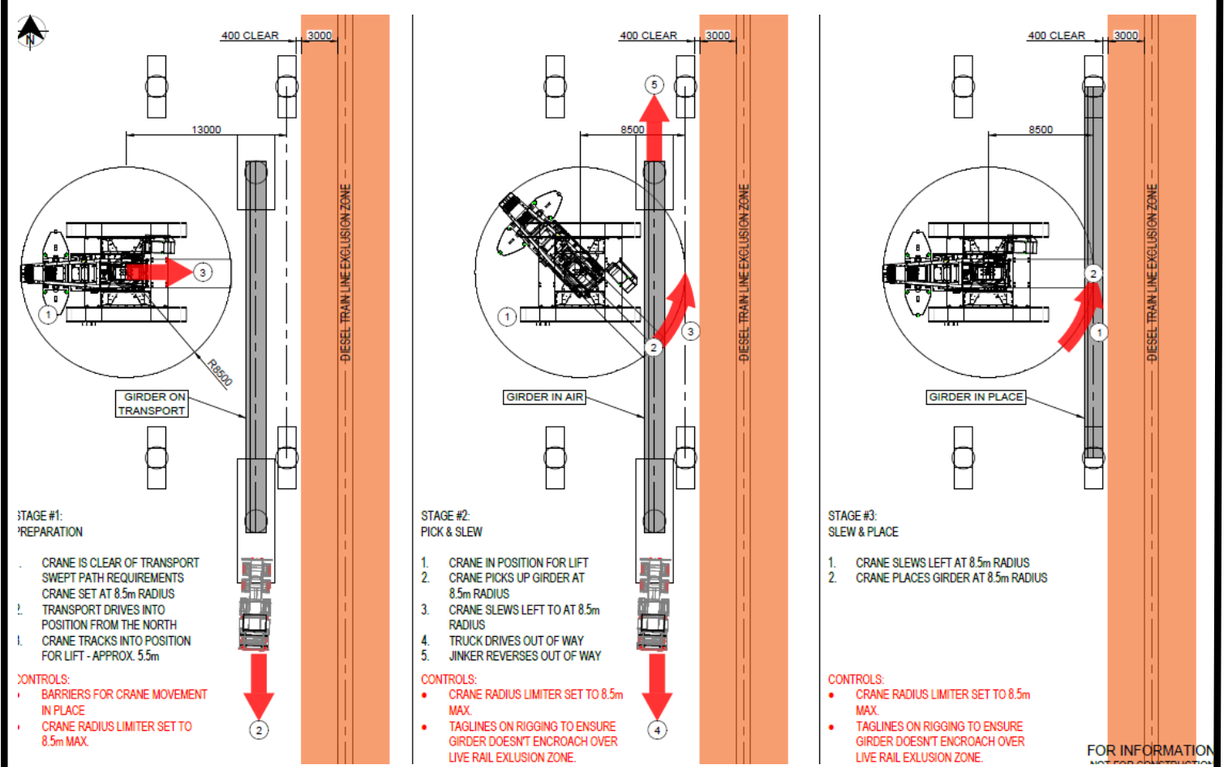
Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary



Precast Installation:

Installation of x 6 Beams -

- Install Beams Bay 30 / 31 – (BN30-CE = TBC, BN30-E = 97T)

- Install Beams Bay 29 / 30 – (BN29-CE = TBC, BN29-E = 97T)

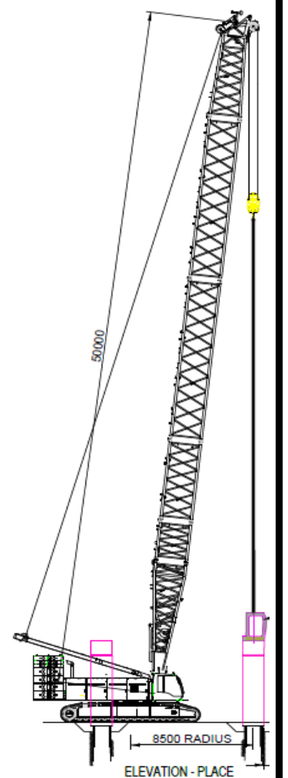
- Install Beams Bay 28 / 29 – (BN28-CE = TBC, BN28-E = 97T)

Plank Installation:

Plank Span – 34 East

Plank Span – 33 East

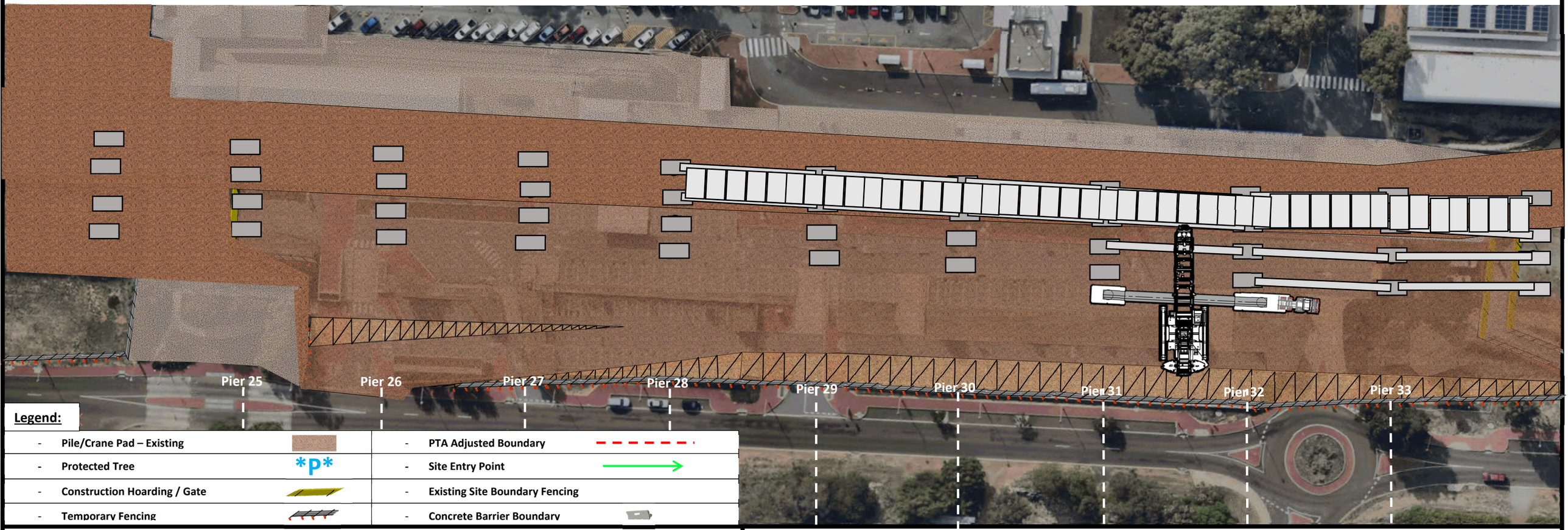
Plank Span – 32 East



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 17)
(Eastern Beam & Plank Installation)

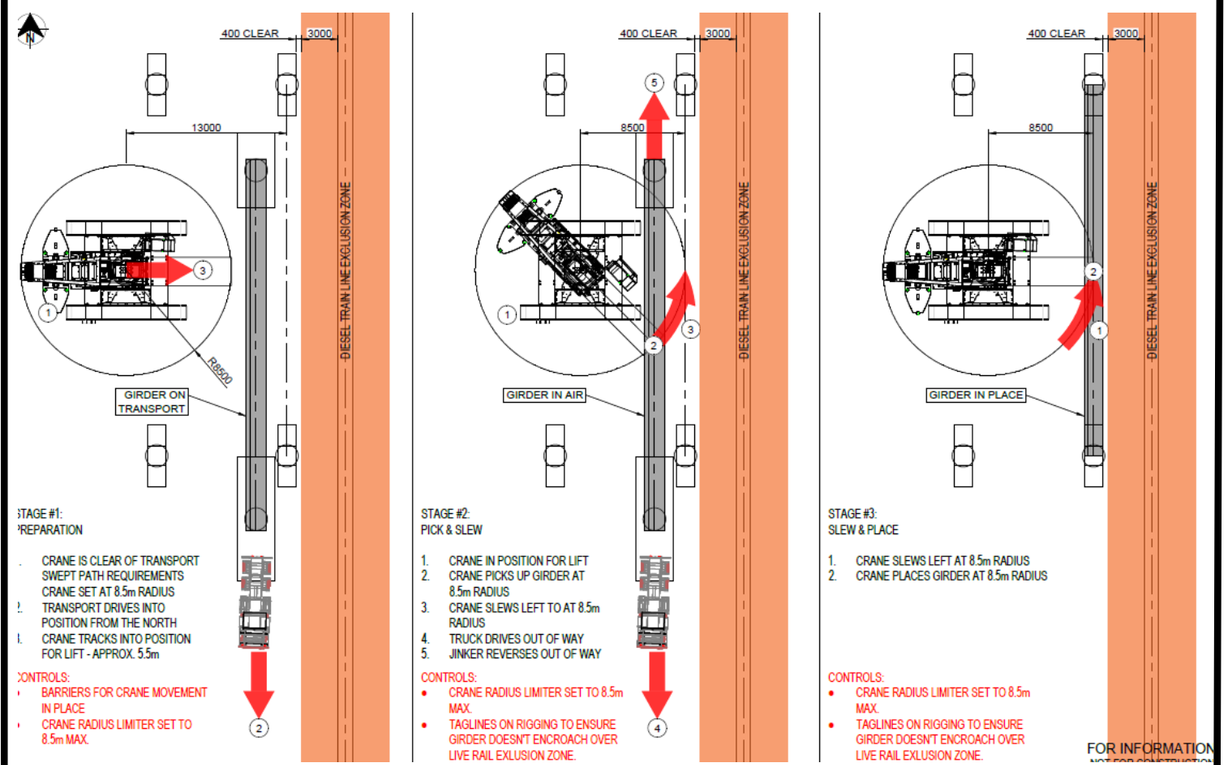
Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary



Precast Installation:

Installation of x 6 Beams -

- Install Beams Bay 33 / 34 (Shift 8) – (BN32-CW = 113.5T, BN32-W = 113.5T)

- Install Beams Bay 32 / 33 (Shift 9) – (BN32-CW = 113.5T, BN32-W = 113.5T)

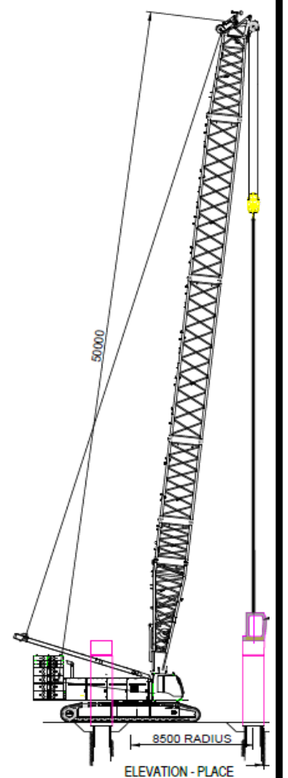
- Install Beams Bay 31 / 32 (Shift 10) – (BN31-CW = TBC, BN31-W = 113.5T)

Plank Installation:

Plank Span – 31 East

Plank Span – 30 East

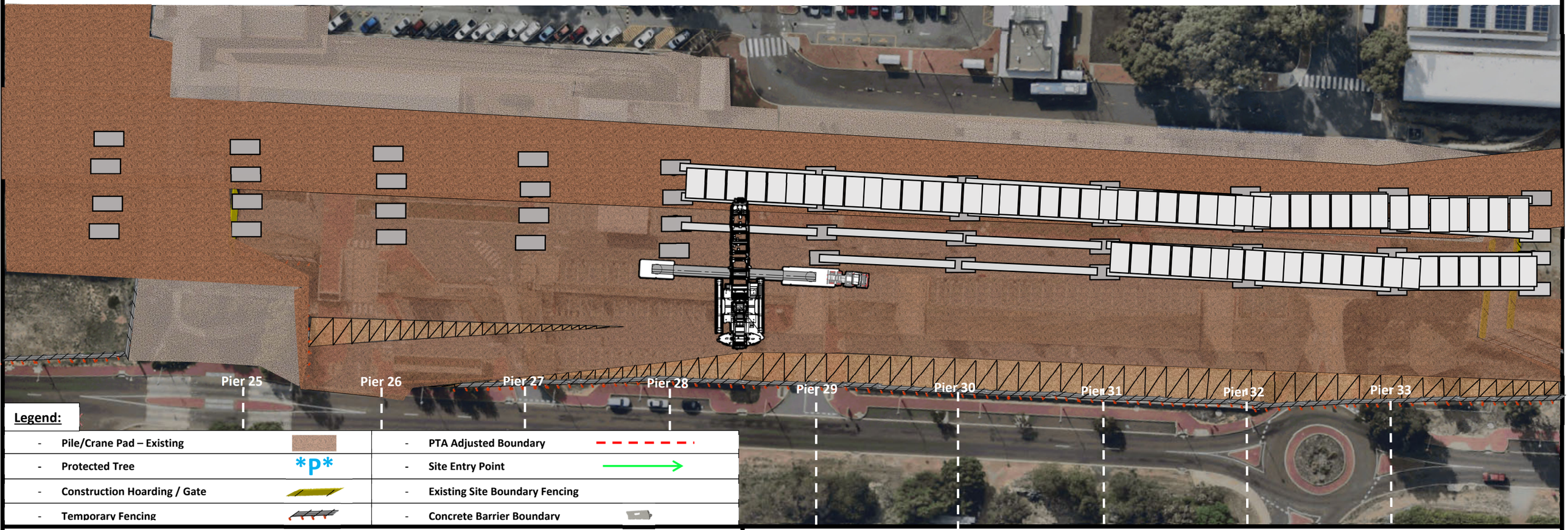
Plank Span – 29 East



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 18)
(Eastern Beam & Plank Installation)

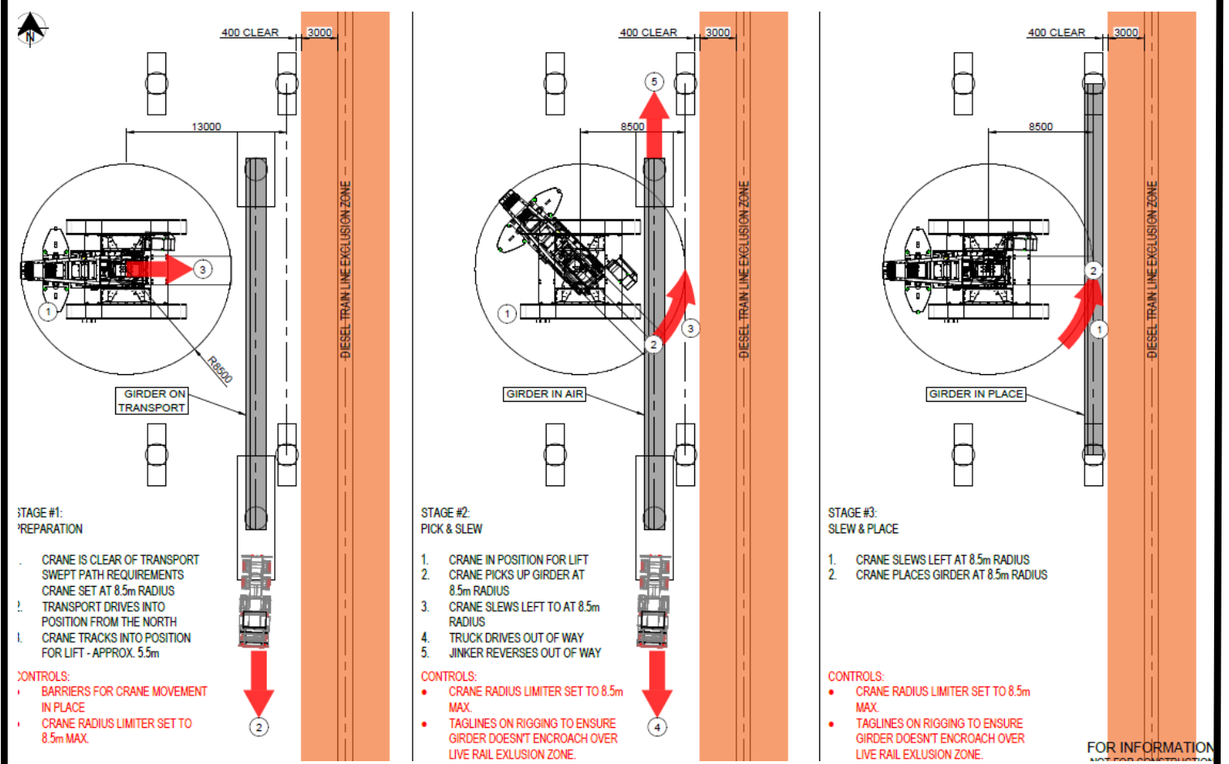
Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary



Precast Installation:

Installation of x 6 Beams -

- Install Beams Bay 30 / 31 (Shift 11) – (BN30-CW = TBC, BN30-W = 97T)

- Install Beams Bay 29 / 30 (Shift 12) – (BN29-CW = TBC, BN29-W = 97T)

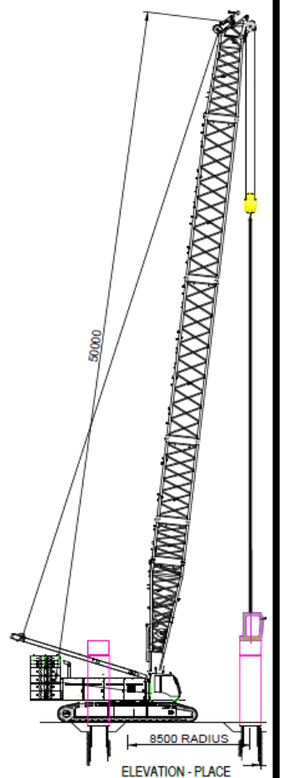
- Install Beams Bay 28 / 29 (Shift 13) – (BN28-CW = TBC, BN28-W = 97T)

Plank Installation:

Plank Span – 34 East

Plank Span – 33 East

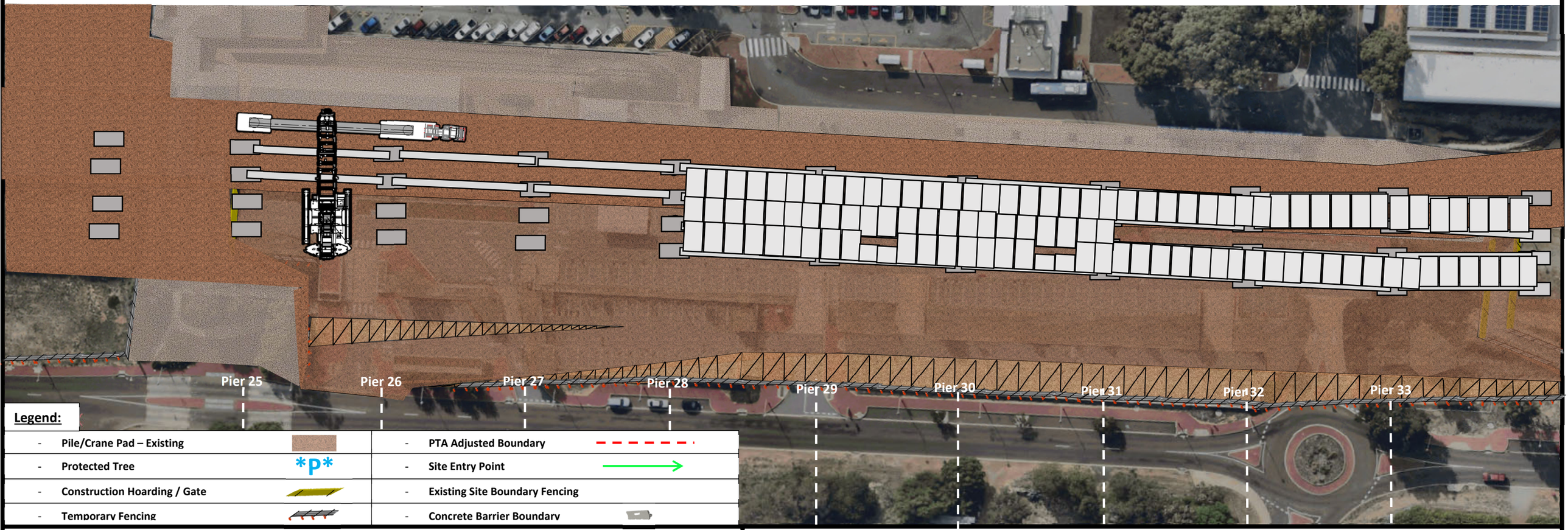
Plank Span – 32 East



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 19)
(Eastern Beam & Plank Installation)

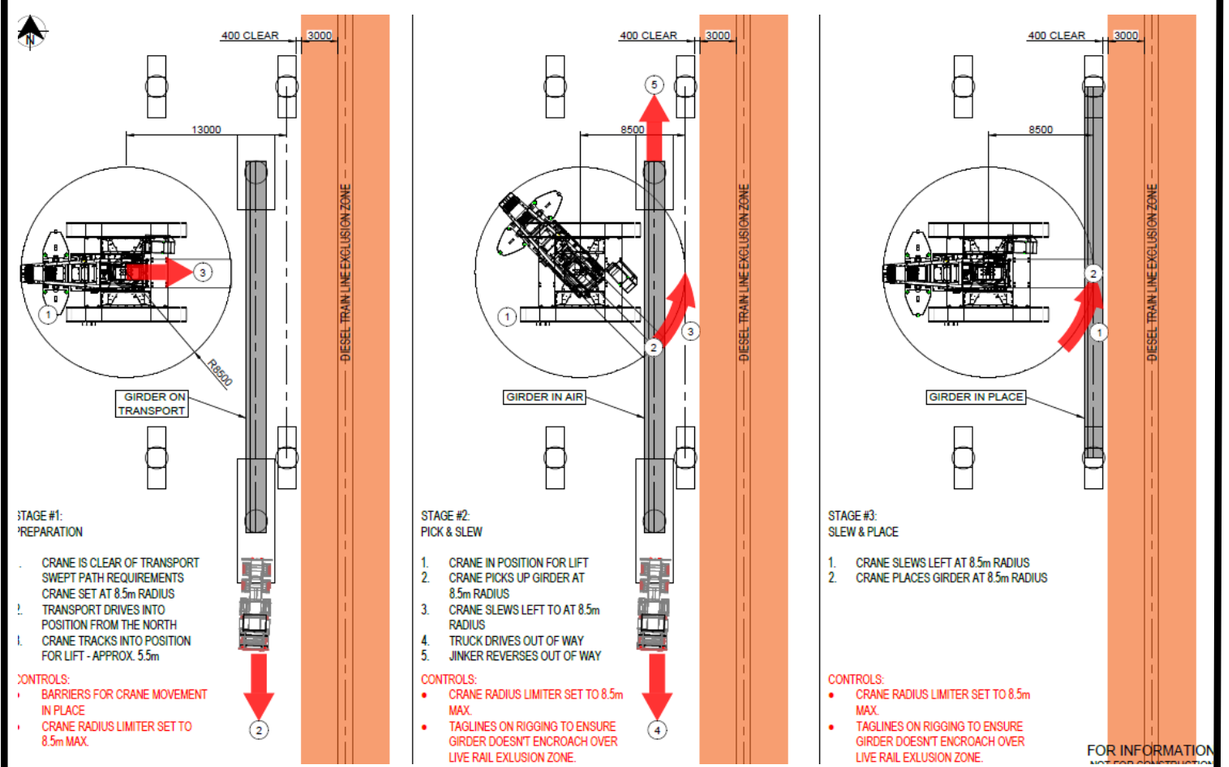
Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary



Precast Installation:

Installation of x 6 Beams -

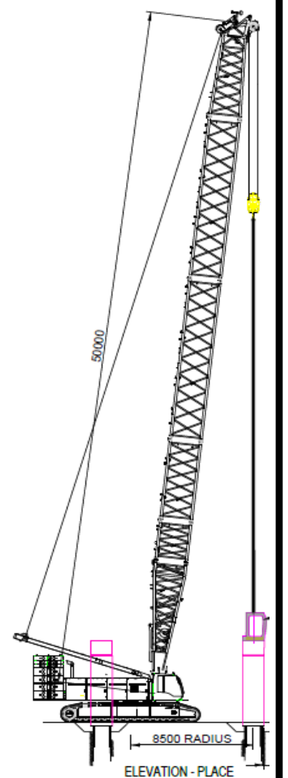
- Install Beams Bay 25 / 26 – (BN25-CE = TBC, BN25-E = TBC)
- Install Beams Bay 26 / 27 – (BN26-CE = TBC, BN26-E = TBC)
- Install Beams Bay 27 / 28 – (BN27-CE = TBC, BN27-E = 113.5T)

Plank Installation:

Plank Span – 31 West

Plank Span – 30 West

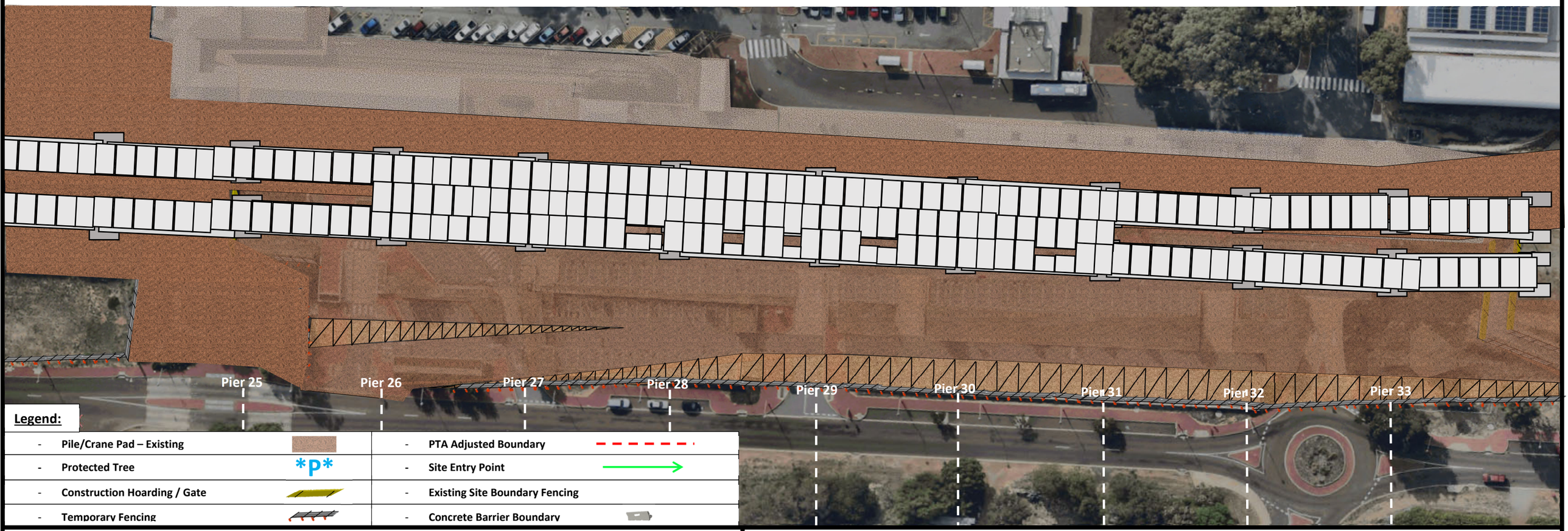
Plank Span – 29 West



ARMADALE STATION POSSESSION WORKS – East Precast Install (Stage 20)
(Eastern Beam & Plank Installation)

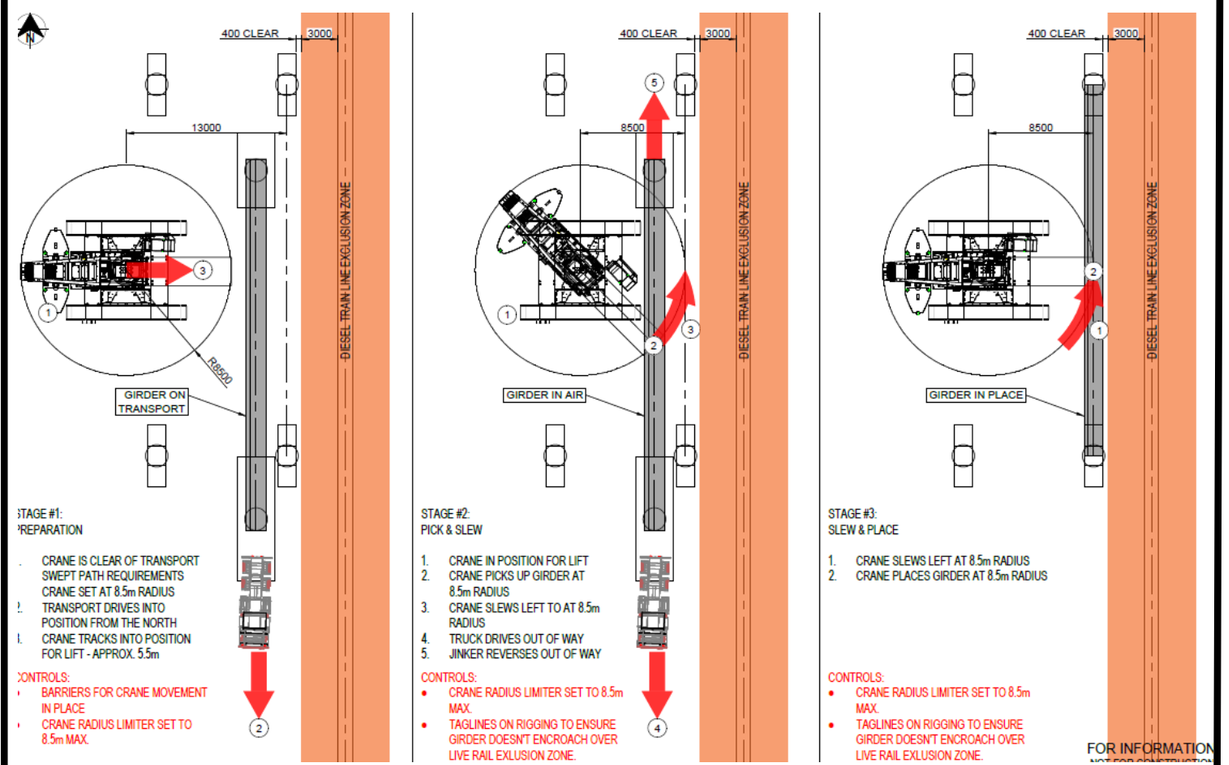
Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

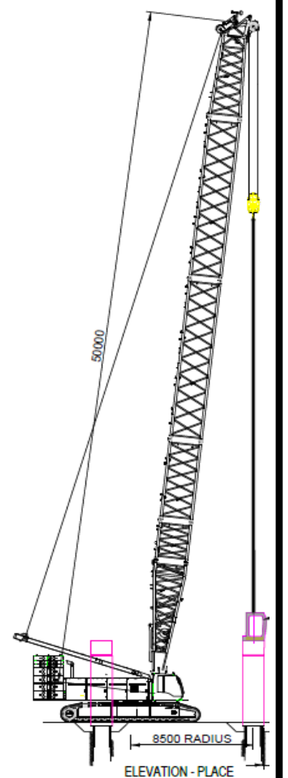
-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary



Precast Installation:

Construction Sequence continues as per previous logic – to completion

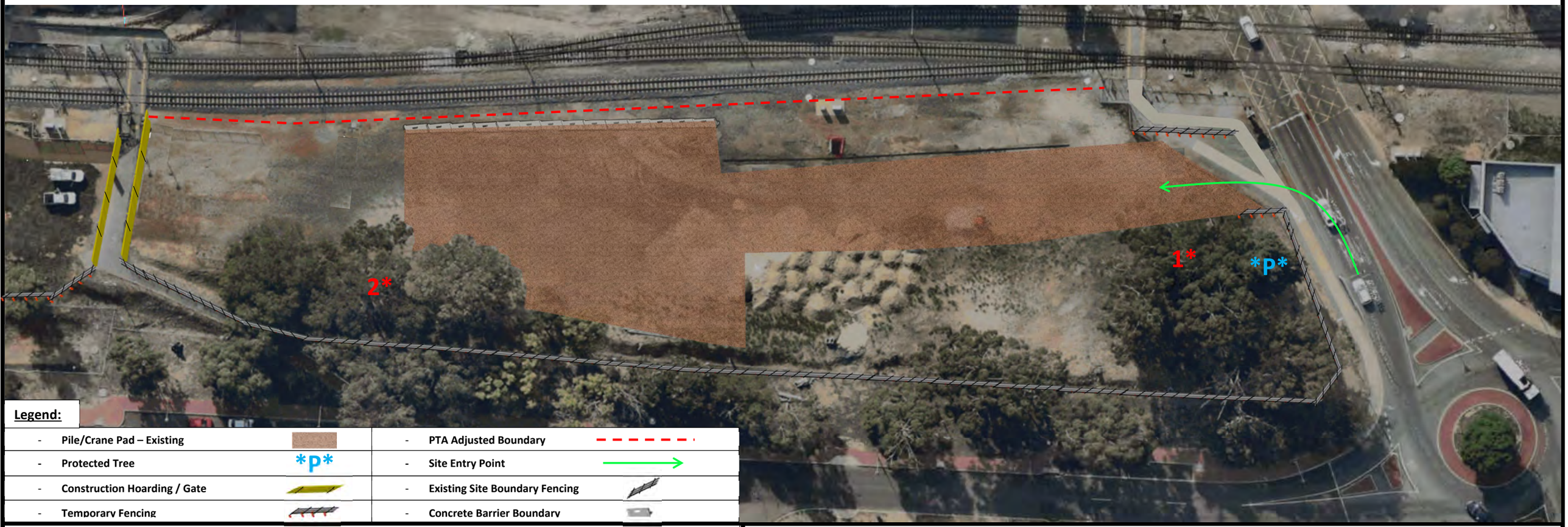
***Note: Imagery and extent of structure is for conceptual purposes only and may not reflect final desing**



Construction Staging – Concept
Aston Williams

CHURCH AVENUE EARLY WORKS – Tree Removal (Stage 1)
(Temporary Fencing / Service Management / Pedestrian Management)

MetCONNX



Legend:

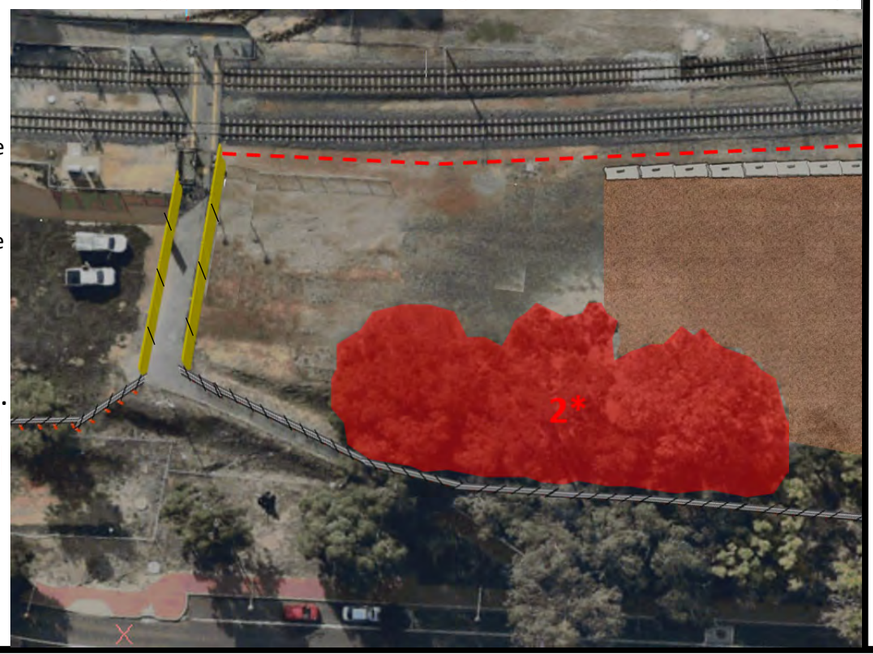
-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Northern Zone – Early Works

- **Construction Hoarding** to be erected either side of existing pedestrian path. Hoarding shall allow for existing crossing to be maintained during the adjacent construction works.
  (**Note:** Hoarding should include oversized gate – to allow for crane/pile rig movements through to adjacent area)

- **Service Relocation / Protection**
  Services team to complete all required service relocations / removals in this zone to accommodate construction works. Any Services which are unable to be removed are to be protected via temporary works during construction.

- **Tree Removal / Trimming**
  Trees identified as having a clash with future construction works shall be removed / trimmed.



Northern Zone – Early Works

- **PEDESTRIAN PATH** and site fence adjustment
  (Pedestrian path to be diverted closer to road, allowing for minor extension of site boundary to the north for final pile location)

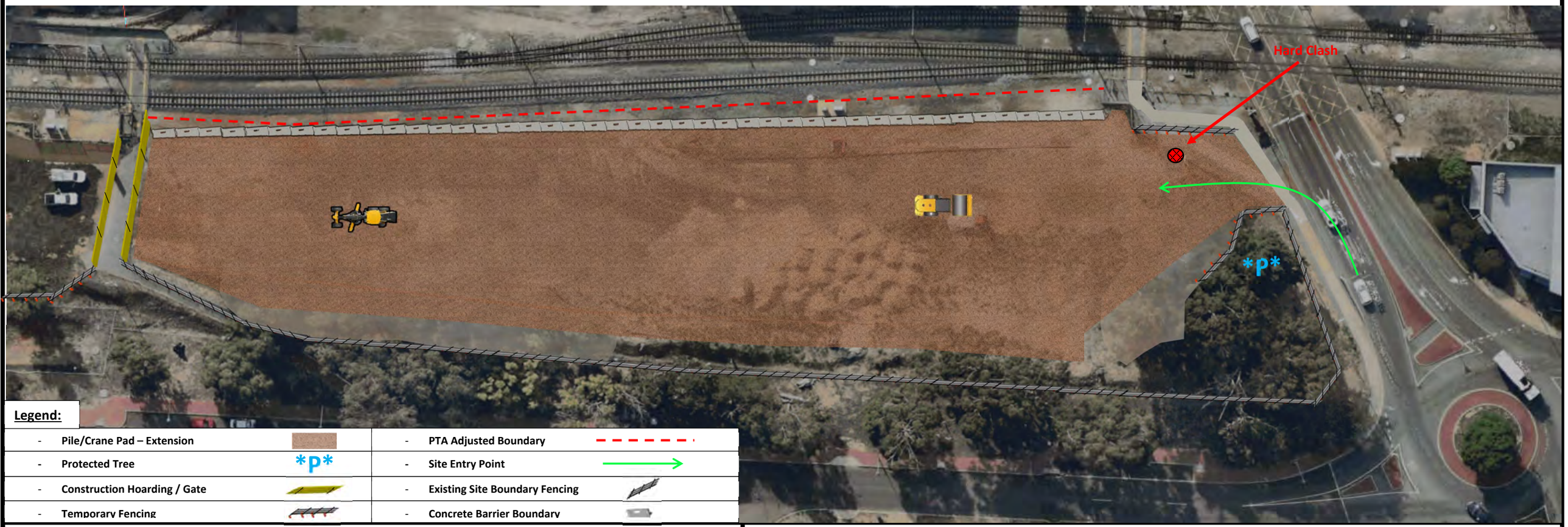
- **Heritage Tree Protection**
  Tree noted a *P* has shall be protected during the construction works. Tree removal team shall be briefed on its presence and water barriers or similar shall be set up around it to protect it from adjacent works.

- **Tree / Trimming**
  Trees identified as having a clash with future construction works shall be removed / trimmed.

CHURCH AVENUE EARLY WORKS – Piling / Crane Pad Construction (Stage 2)
(Crane Pad Construction)

Construction Staging – Concept
Aston Williams

MetCONNX



Mobilization of Plant and Materials:

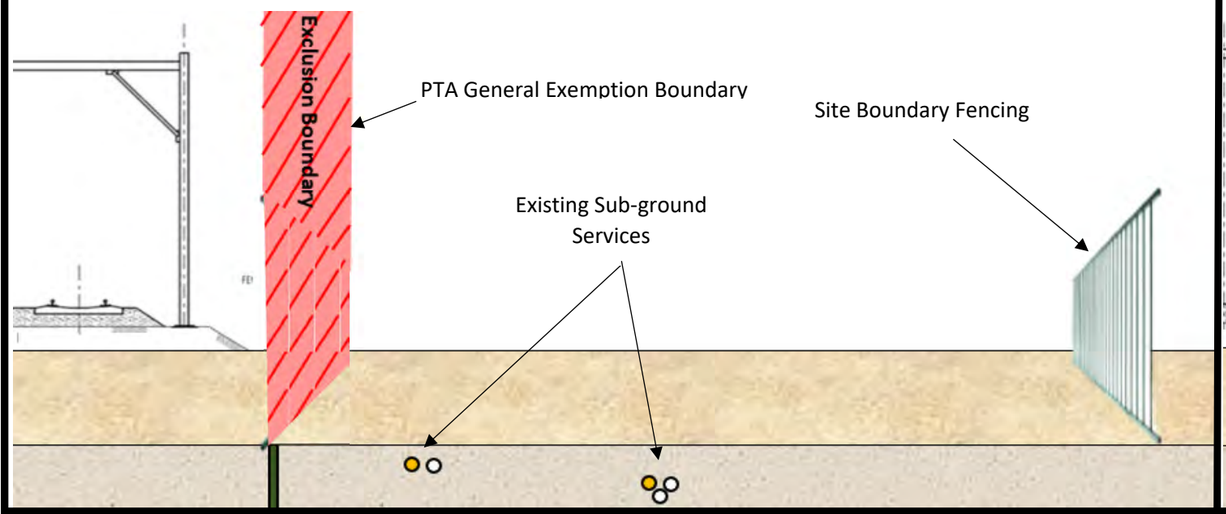
- All plant & material deliveries shall occur via the Church Avenue main site access gate

Services Relocation / Protection:

- Services team to identify all PTA services / service pits which run within the planned pad construction zone.
- Services to either be relocated / decommissioned or protected via temporary works prior to pad construction.
- HARD CLASH detected at pile location Pier 39. Trenching / relocation works to occur during or prior to this stage.

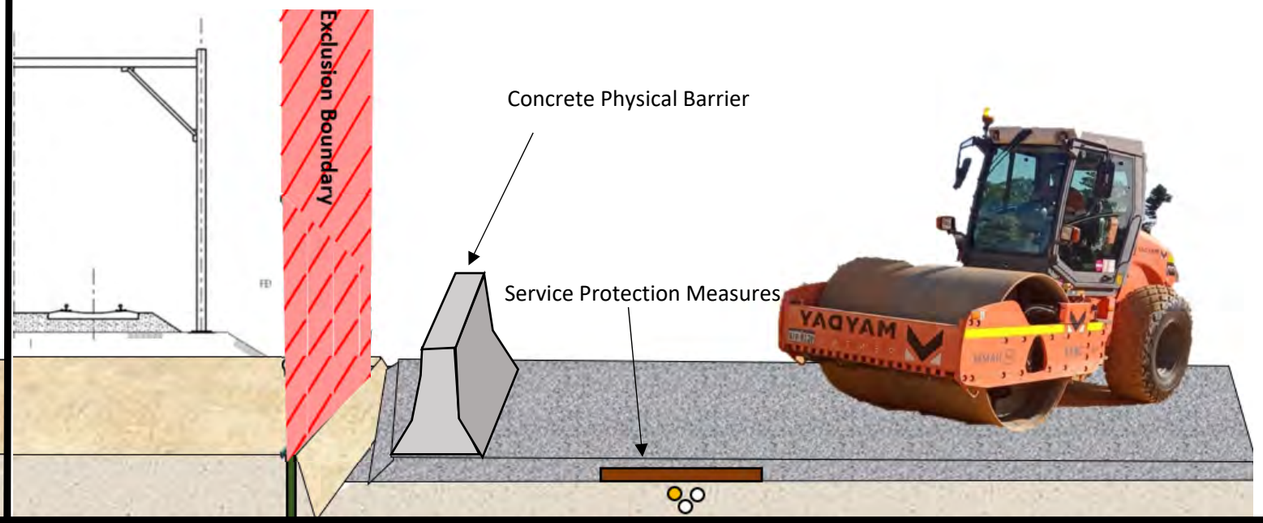
PTA Boundary Establishment

- Concrete Barriers shall be placed along existing PTA general exemption fencing to provide physical barrier.



Crane / Piling Pad Construction:

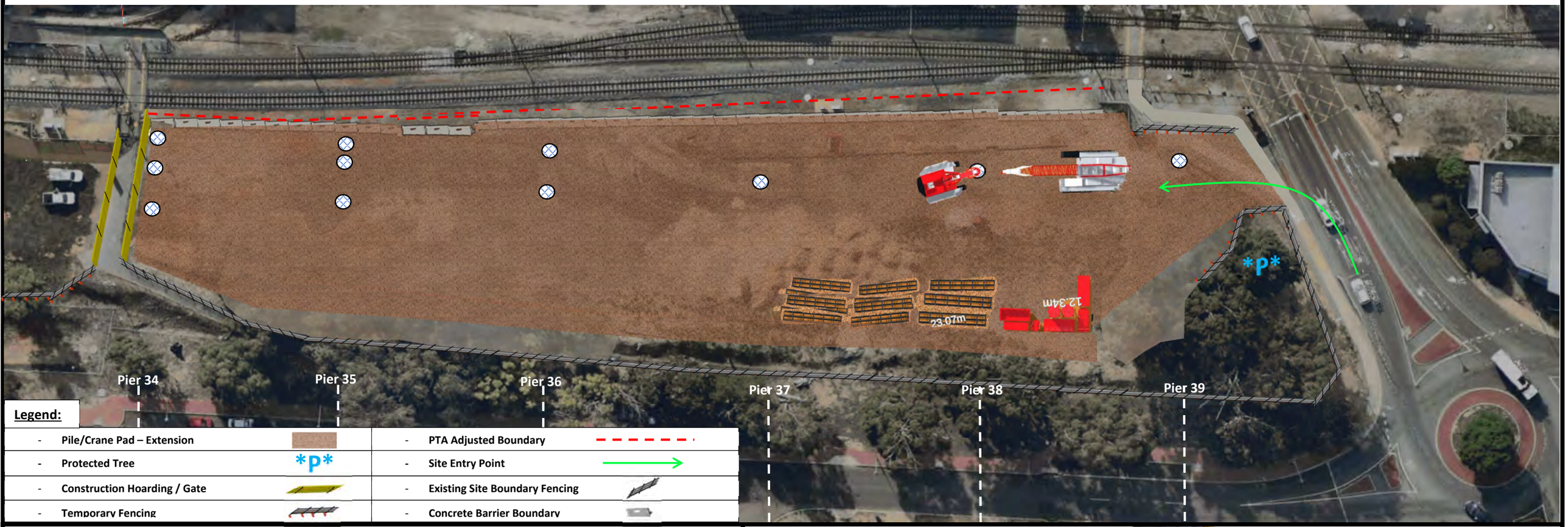
- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



CHURCH AVENUE EARLY WORKS – Piling Works (Stage 3)
(Piling)

Construction Staging – Concept
Aston Williams

MetCONNX

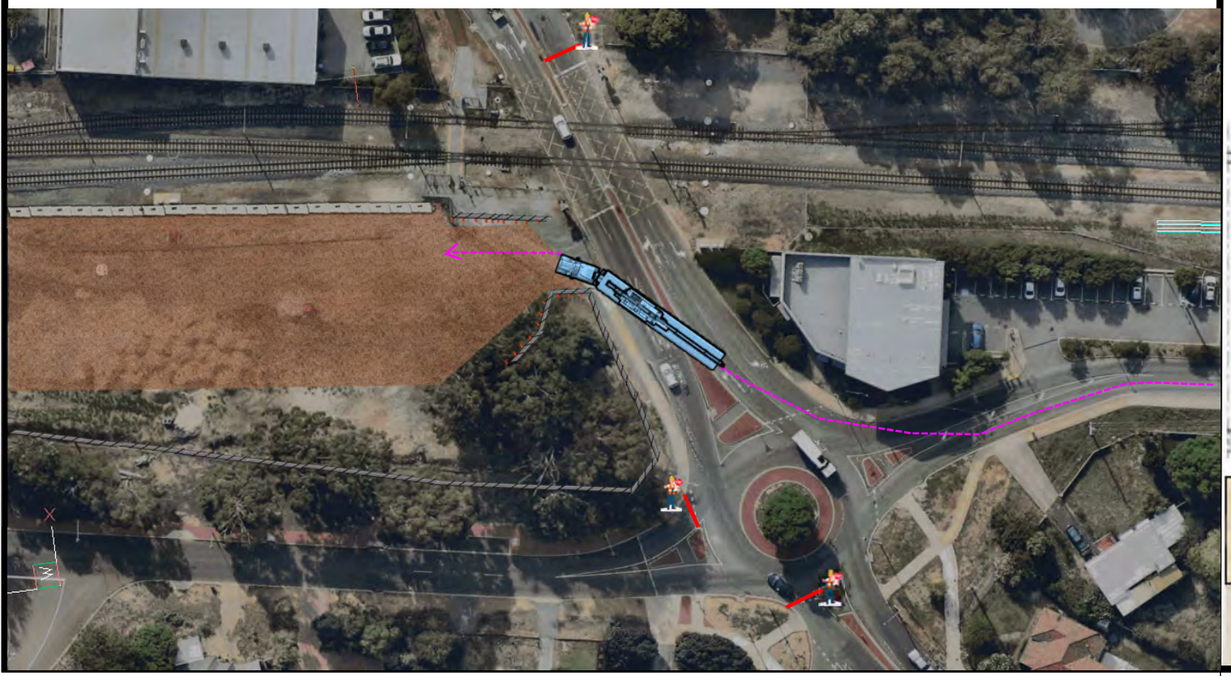


Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

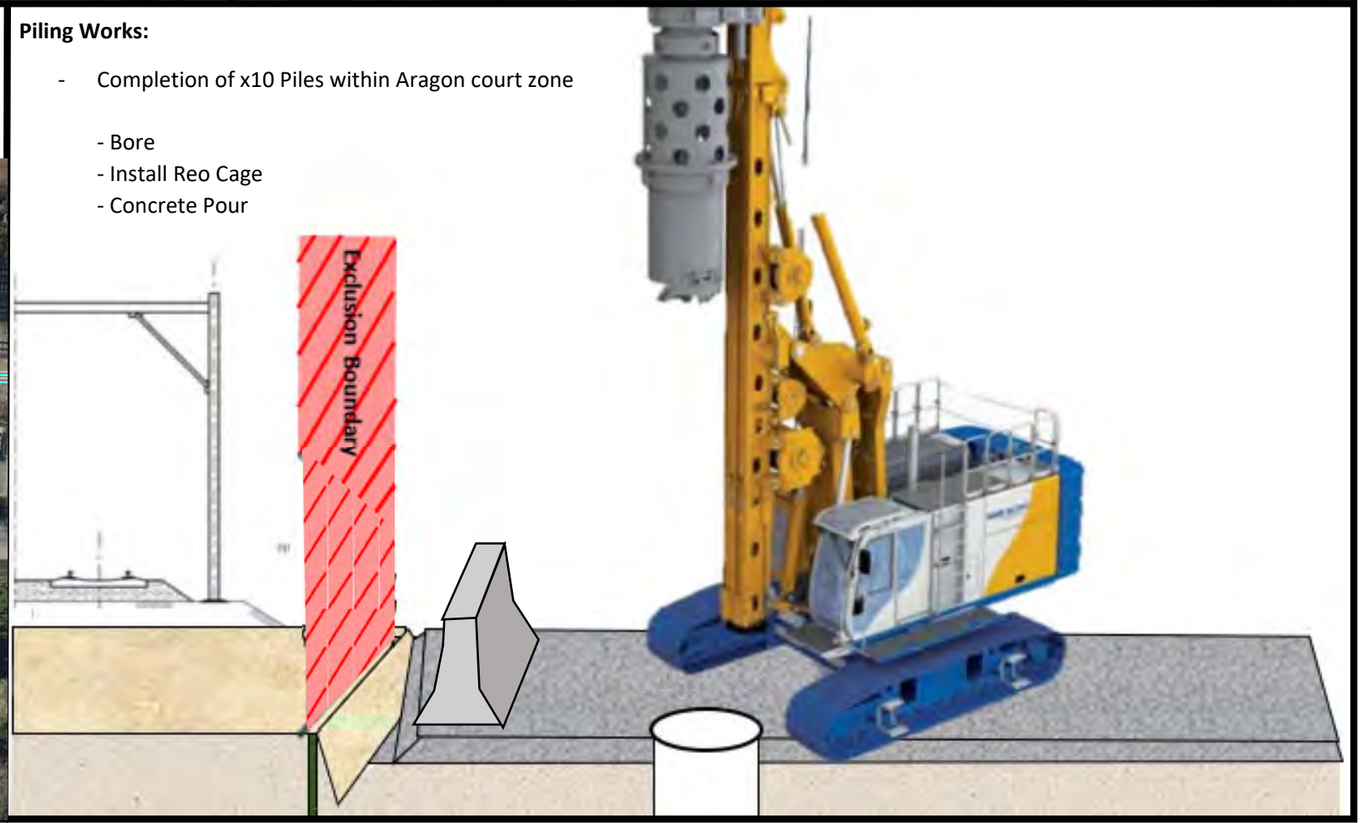
- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).



Piling Works:

- Completion of x10 Piles within Aragon court zone

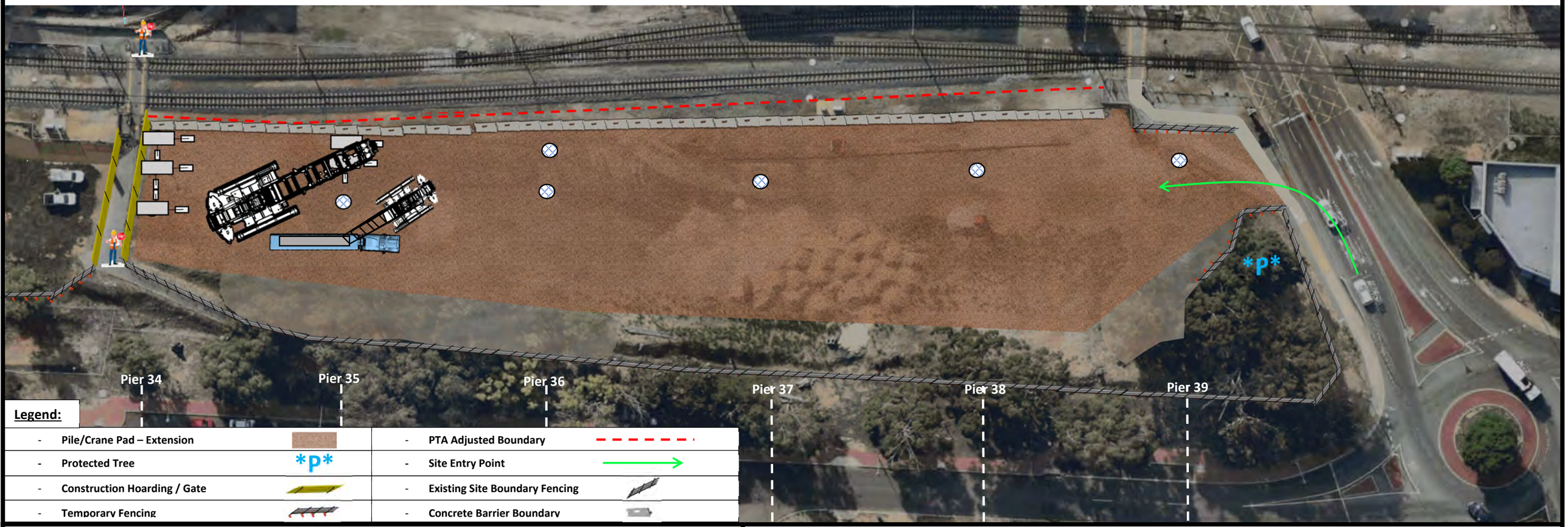
  - Bore
  - Install Reo Cage
  - Concrete Pour



Construction Staging – Concept
Aston Williams

CHURCH AVENUE EARLY WORKS – Column Erection (Stage 4)
(Column & Headstock Install - Pier 34-35)

MetCONNX



Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).

Precast Installation:

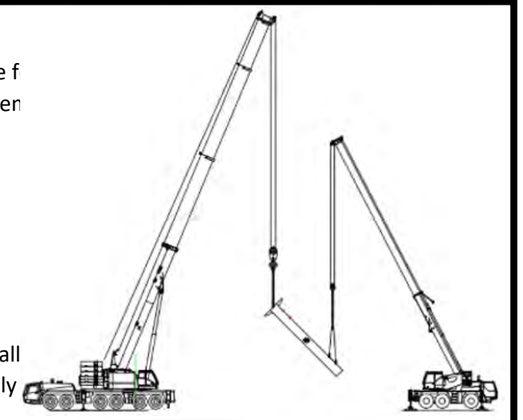
Installation of x6 Columns & x 6 Headstocks - Columns shall utilize a secondary crane f
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian manager

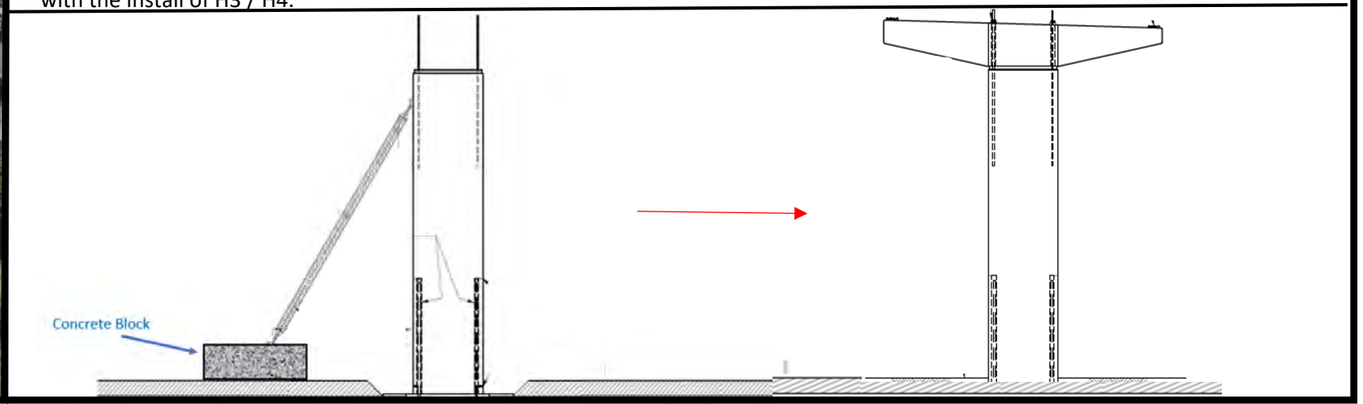
Stage A :

- Install Columns P1 to P6 in that sequence
- Grouting to occur following install
- Grout for P1 & P2 should have reached strength by the time P5 & P6 are installed (To allow Headstock Stage To Commence)

Stage B :

- Install Headstocks H1 to H6 in that sequence
- Mobile Scaffold tower to be lifted adjacent to H1 & H2 following on from their install
- Torquing of Headstock connection bars for H1 & H2 to be completed simultaneously with the install of H3 / H4.

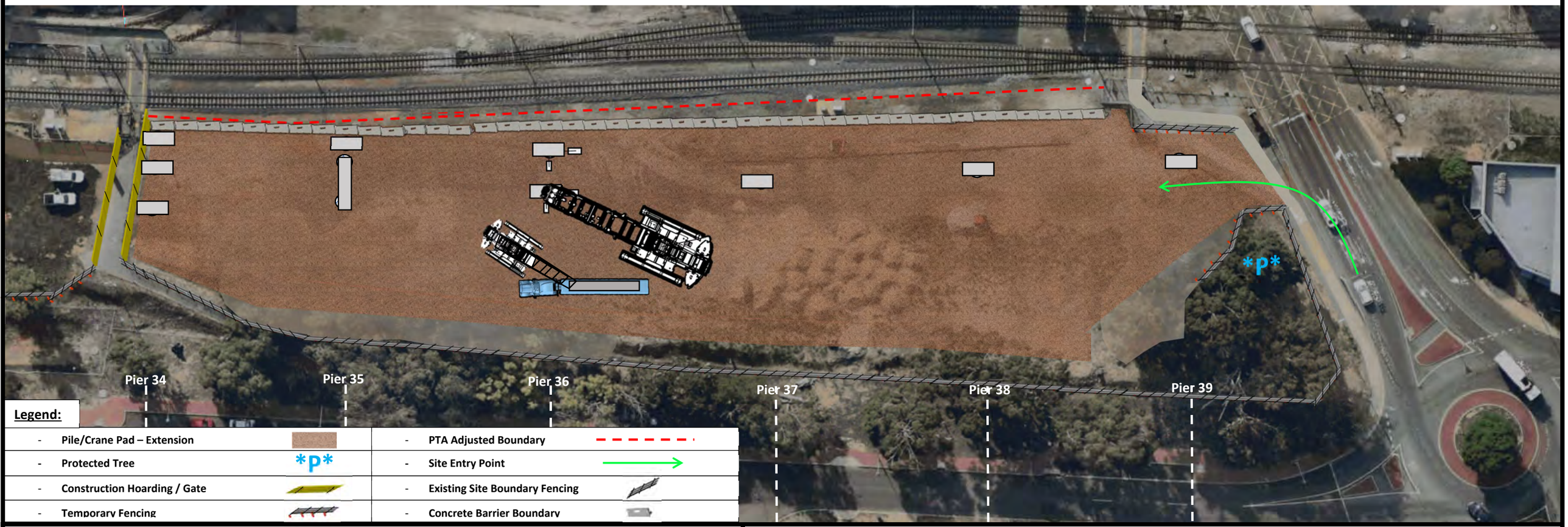




CHURCH AVENUE EARLY WORKS – Column Erection (Stage 5)
(Column & Headstock Install - Pier 36-39)

Construction Staging – Concept
Aston Williams

MetCONNX



Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries:

- Due to site entries proximity to roundabout and active rail crossing – oversized plant / precast deliveries to site will require traffic control to be put in place for special case manoeuvre. Traffic controllers to be placed at each entry point to the roundabout and one placed to close off road approach to rail crossing – as depicted below. (Routes to be planned).

Precast Installation:

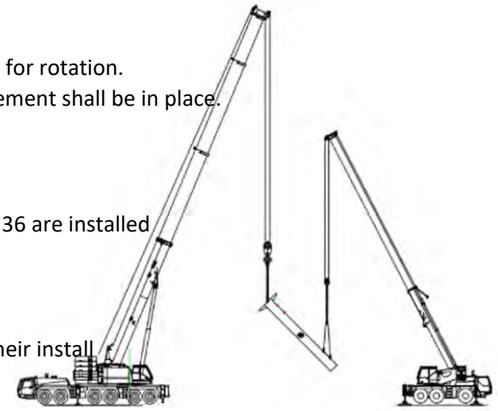
Installation of x5 Columns & x 5 Headstocks - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

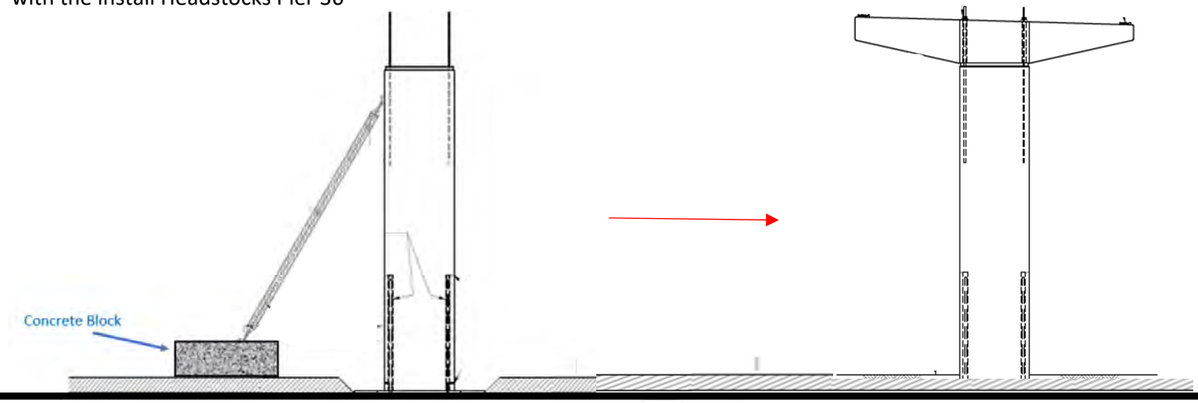
Stage A :

- Install Columns Pier 39 / Pier 38 / Pier 37 in that sequence
- Grouting to occur following install
- Grout for Pier 39 / Pier 38 / Pier 37 should have reached strength by the time pier 36 are installed (To allow Headstock Stage To Commence)

Stage B :

- Install Headstocks Pier 39 / Pier 38 / Pier 37 in that sequence
- Mobile Scaffold tower to be lifted adjacent to Pier 39 / Pier 38 following on from their install
- Torquing of Headstock connection bars for Pier 39 / Pier 38 simultaneously with the install Headstocks Pier 36





Construction Staging – Concept
Aston Williams

CHURCH AVENUE POSSESSION WORKS – Site Adjustment (Stage 6)
(Site Boundary Adjustment)

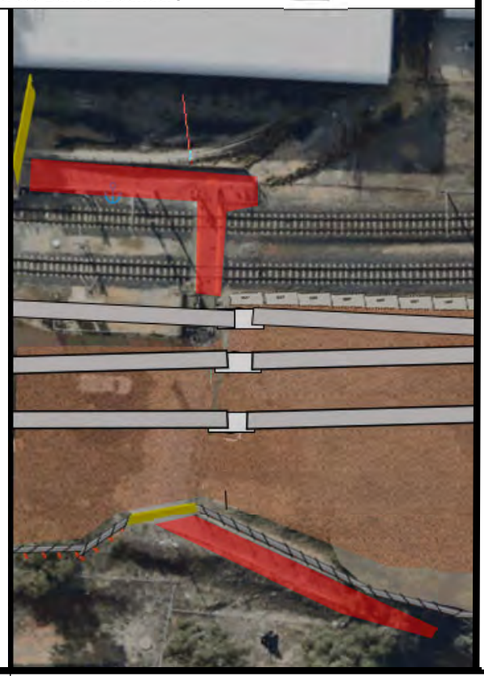
MetCONNX

Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Northern Access Adjustment:

- Pedestrian rail crossing to be permanently closed – Construction fence / hoarding put in place to prevent access of public.

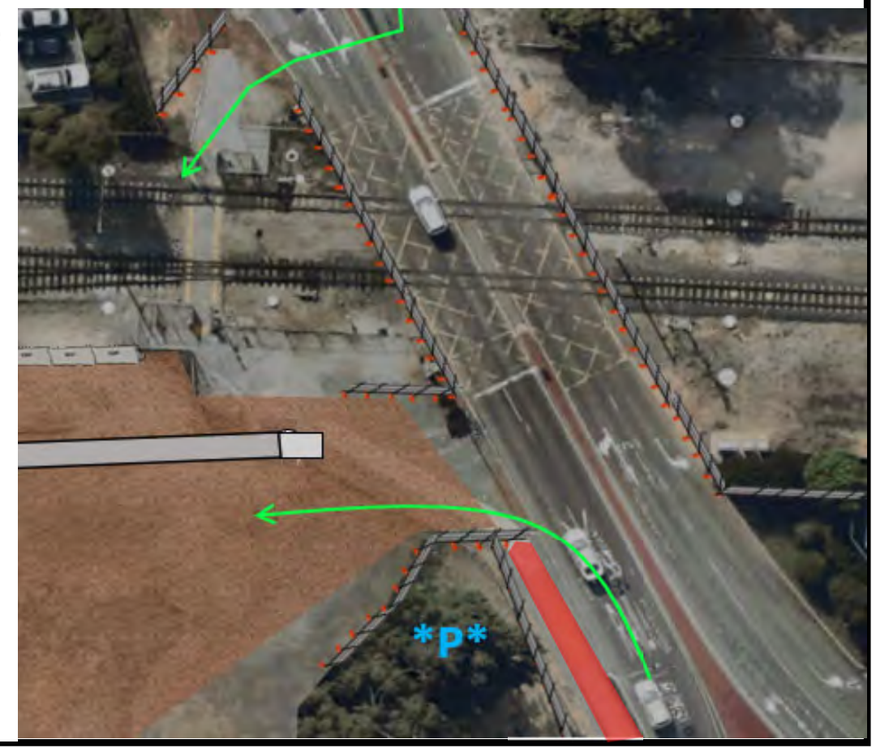


Decommissioning of all PTA Assets:

- Decommissioning of all live rail assets to commence as soon as possession period begins.

Southern Access Adjustment:

- Pedestrian pathway along Northern site boundary to be permanently closed & site boundary pushed out towards road.
- Additional Access gate to be set up on Eastern side of tracks for *Special case deliveries)
- Site boundaries to be adjusted / set up to full extent (Excluding road)



Construction Staging – Concept
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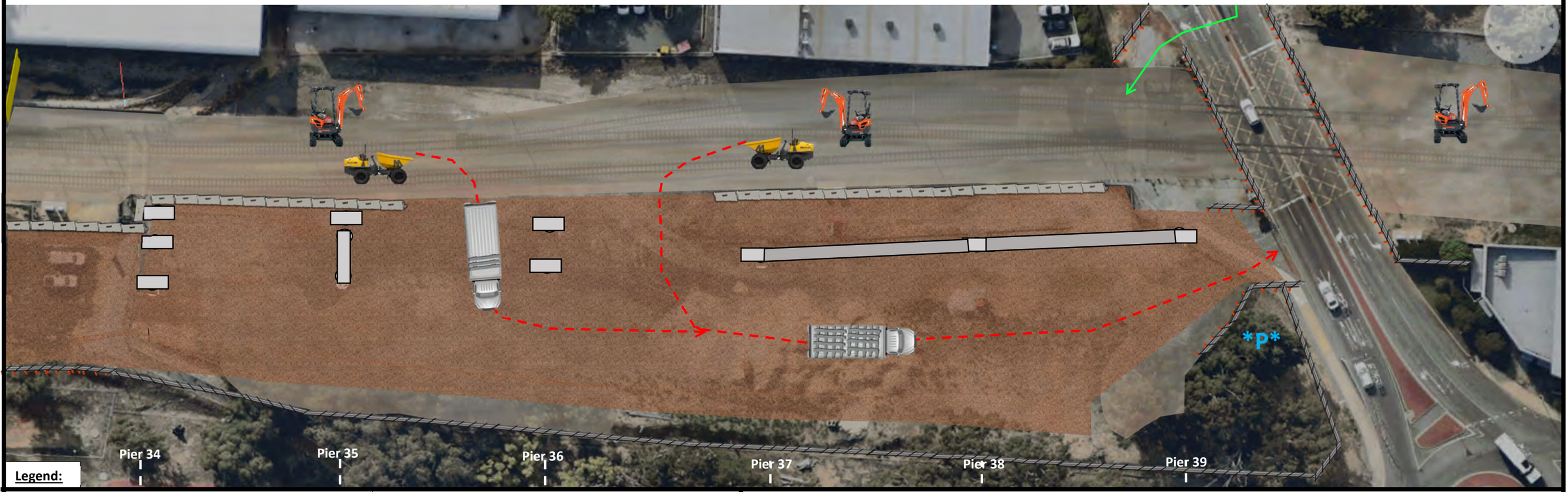
CHURCH AVENUE POSSESSION WORKS – Rail Demolition (Stage 7)
(Removal of All Rail Assets)

MetCONNX



Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Rail Demolition:

- Decommission / Remove all Rail electrical / Coms Assets

- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

Geotechnical Testing :

- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

Rail Demolition Notes:

Construction Staging – Concept
Aston Williams

CHURCH AVENUE POSSESSION WORKS – Piling / Crane Pad Extension (Stage 8)
(Crane Pad Extension)

MetCONNX

Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Mobilization of Plant and Materials:

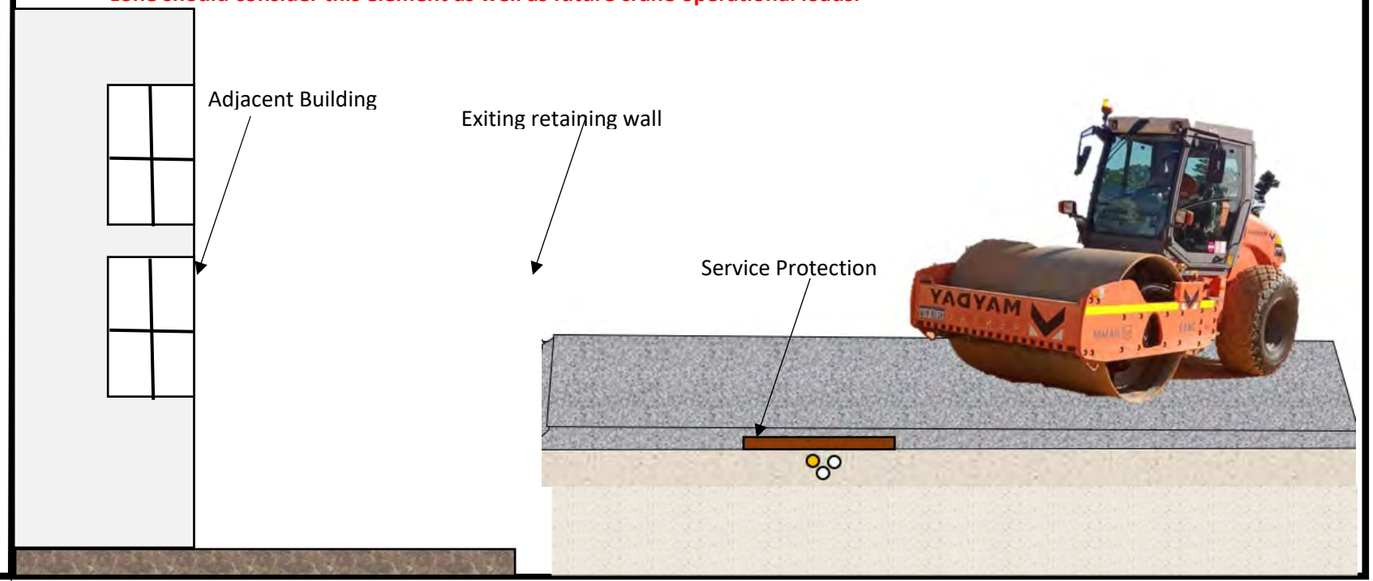
- All plant & material deliveries shall occur via the Church Avenue main site access gate

Services Relocation / Protection:

- Services team to identify all PTA services / service pits which run within the planned pad construction zone.
- Services to either be relocated / decommissioned or protected via temporary works prior to pad construction.

Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.
- **NOTE * : Crane Pad will be adjacent to a existing property retaining wall. Temporary works assessment for crane pad in this zone should consider this element as well as future crane operational loads.**



Construction Staging – Concept
Aston Williams

CHURCH AVENUE POSSESSION WORKS – Piling Works (Stage 9) (Piling)

MetCONNX

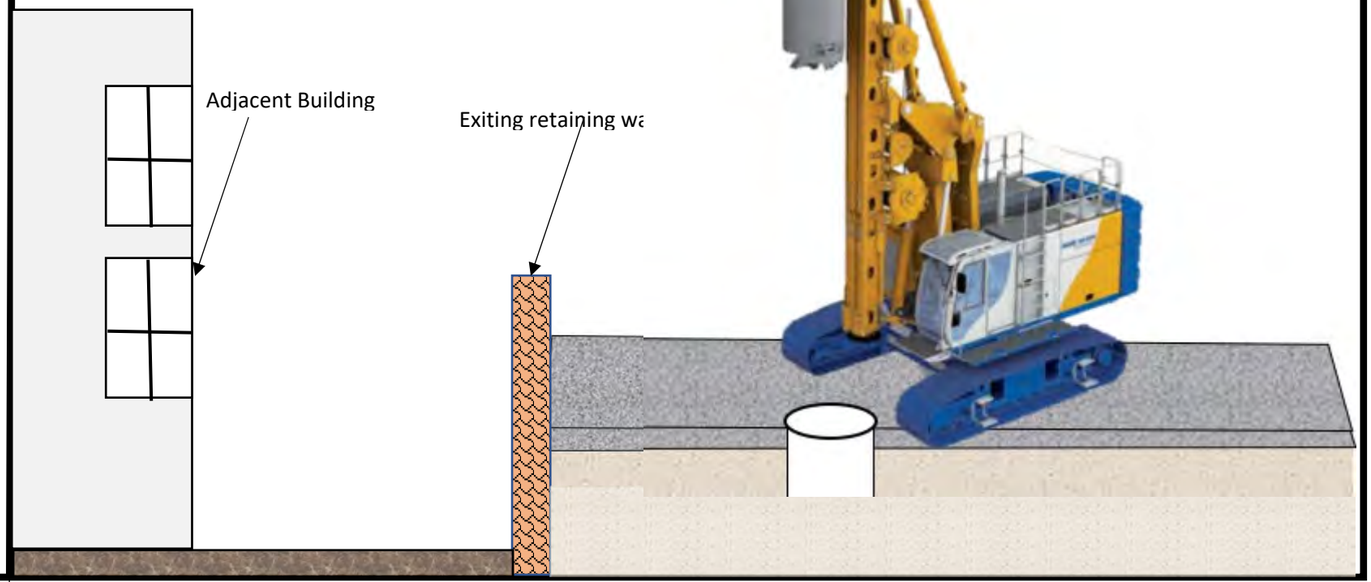
Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Piling Operation Notes:

Piling Works:

- Completion of x10 Piles within Aragon court zone
  - Bore
  - Install Reo Cage
  - Concrete Pour
- **NOTE * : Piling rig operation distance restrictions may apply where working adjacent to exiting building / retaining wall**



Construction Staging – Concept
Aston Williams

CHURCH AVENUE POSSESSION WORKS – Column Erection (Stage 10)
(Column & Headstock Install - Pier 34-36)

MetCONNX

Legend:

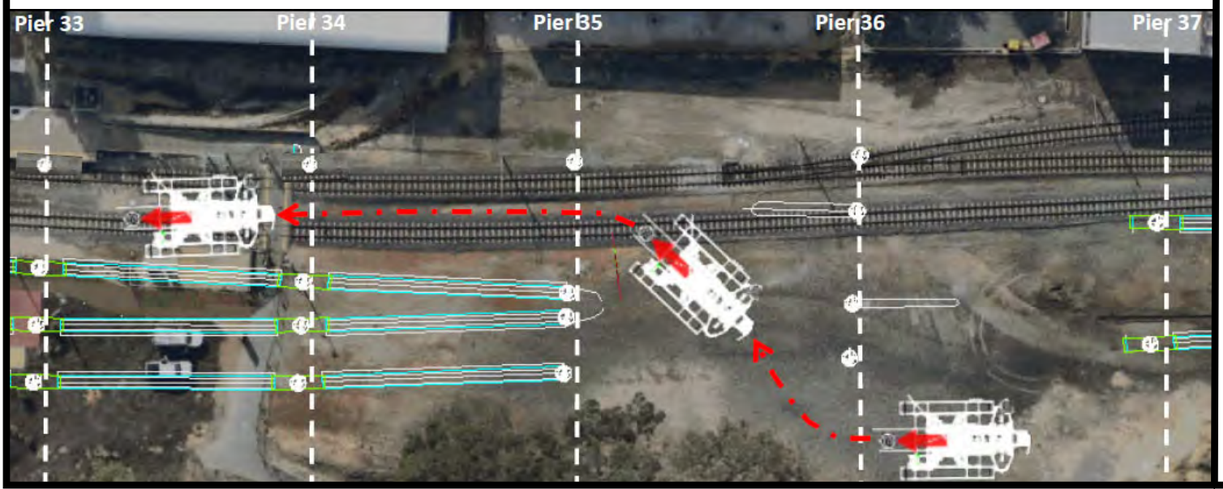
-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Column Installation Notes:

***CHECKS REQUIRED – Beam restricted access to inform install staging**

- CRANE POSITION CHECK BETWEEN PIER 33-35

- DELIVERY TRUCK POSITION CHECK BETWEEN PIER 33-35



Precast Installation:

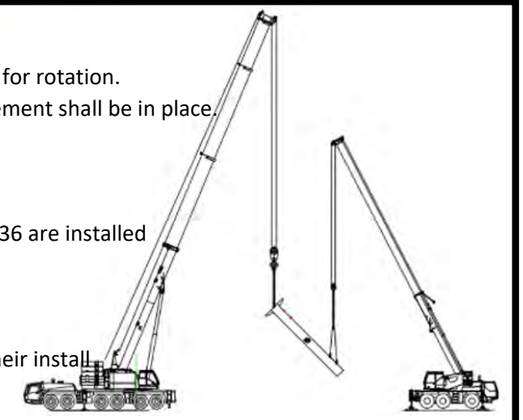
Installation of x5 Columns & x 5 Headstocks - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to pedestrian path – spotters / pedestrian management shall be in place.

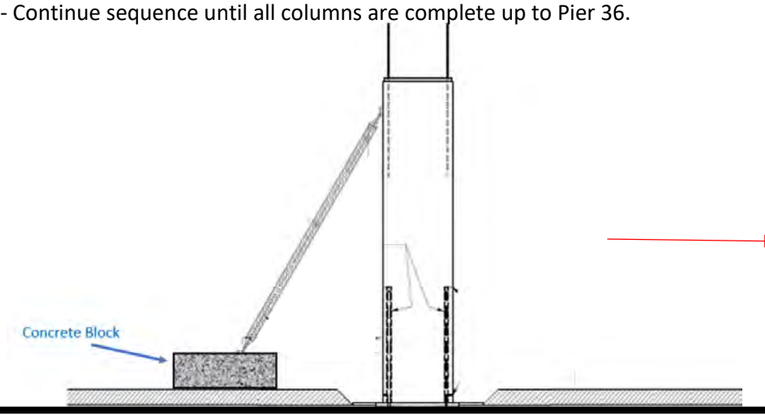
Stage A :

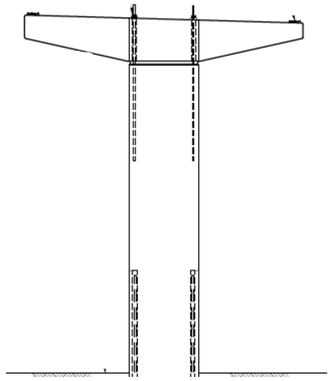
- Install Columns Pier 33 / Pier 34 / Pier 35 / Pier 36 in that sequence
- Grouting to occur following install
- Grout for Pier 33 / Pier 34 / Pier 35 should have reached strength by the time pier 36 are installed (To allow Headstock Stage To Commence)

Stage B :

- Install Headstocks Pier 33 / Pier 34 / Pier 35 in that sequence
- Mobile Scaffold tower to be lifted adjacent to Pier 33 / Pier 34 following on from their install
- Torquing of Headstock connection bars for Pier 33 / Pier 34 simultaneously
- Continue sequence until all columns are complete up to Pier 36.







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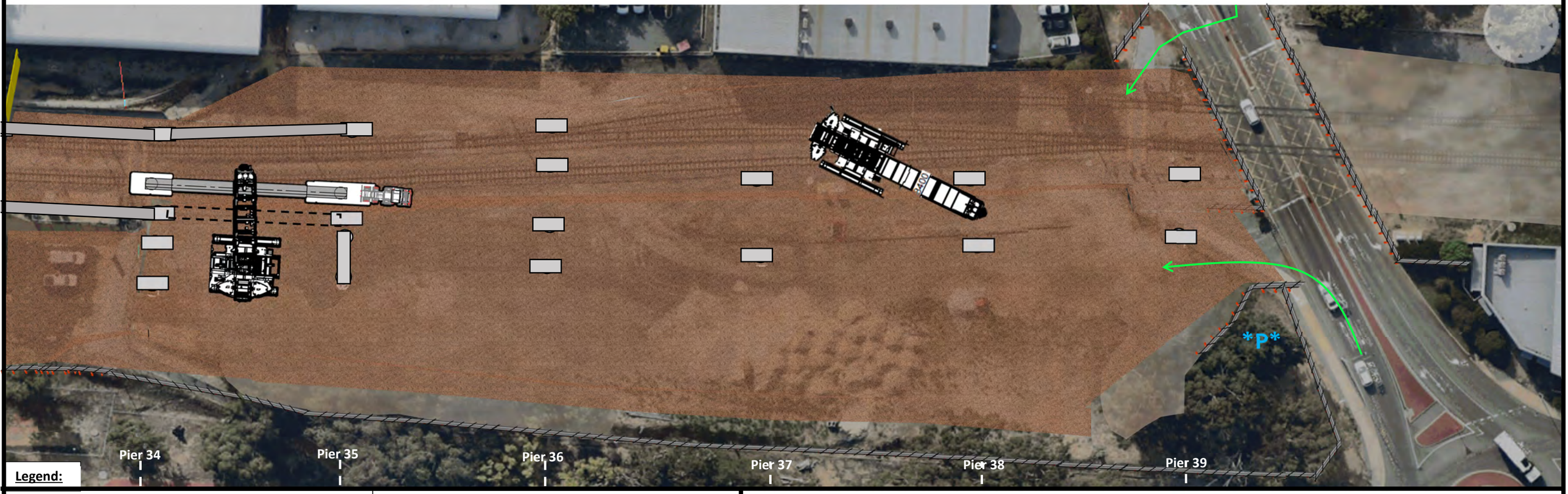
CHURCH AVENUE POSSESSION WORKS – Beam Installation (Stage 11)
(Beam Install - Pier 33-35 & Headstock Install 37-39)

MetCONNX



Legend:

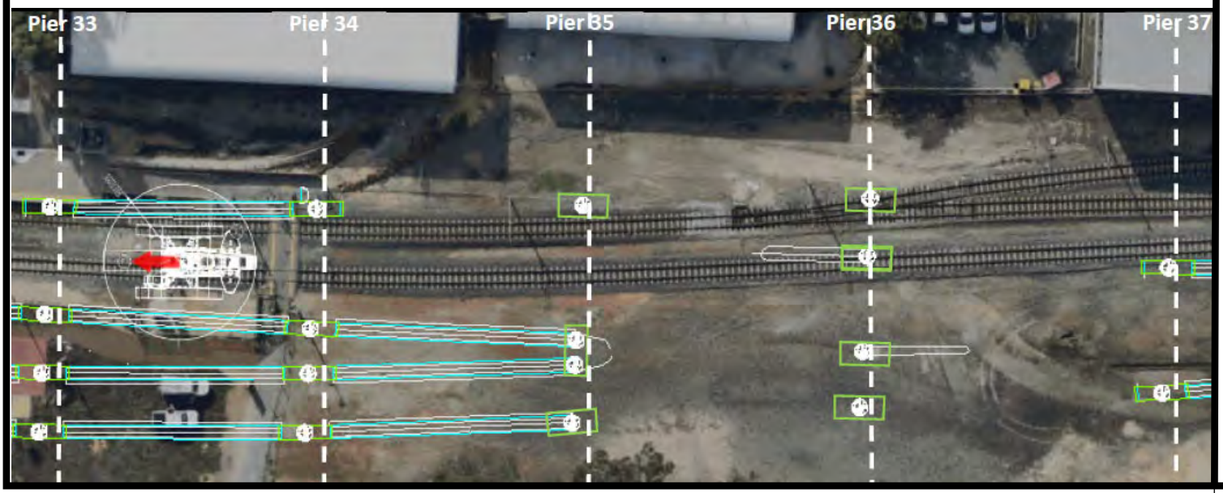
-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Column Installation Notes:

***CHECKS REQUIRED – Can Install be Achieved?**

- CRANE POSITION CHECK BETWEEN PIER 33-35

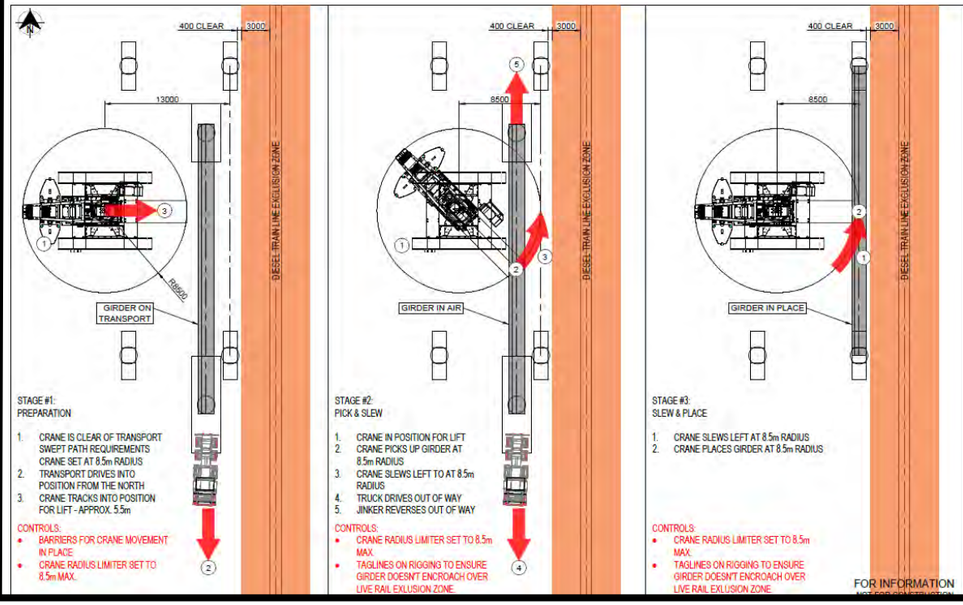
-DELIVERY TRUCK POSITION CHECK BETWEEN PIER 33-35



Precast Installation:

Installation of x4 precast beams – (BN34-E = 97.1T, BN35-E = 114T, BN34-CE = 114T, BN35-CE = 113.5T)

Installation of x3 precast columns / headstocks – Pier 37 to Pier 39



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CHURCH AVENUE POSSESSION WORKS – Beam Installation (Stage 11)
(Beam Install - Pier 35-36)

MetCONNX

Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

***CHECKS REQUIRED –**

- Beam delivery Truck Path Plan Required

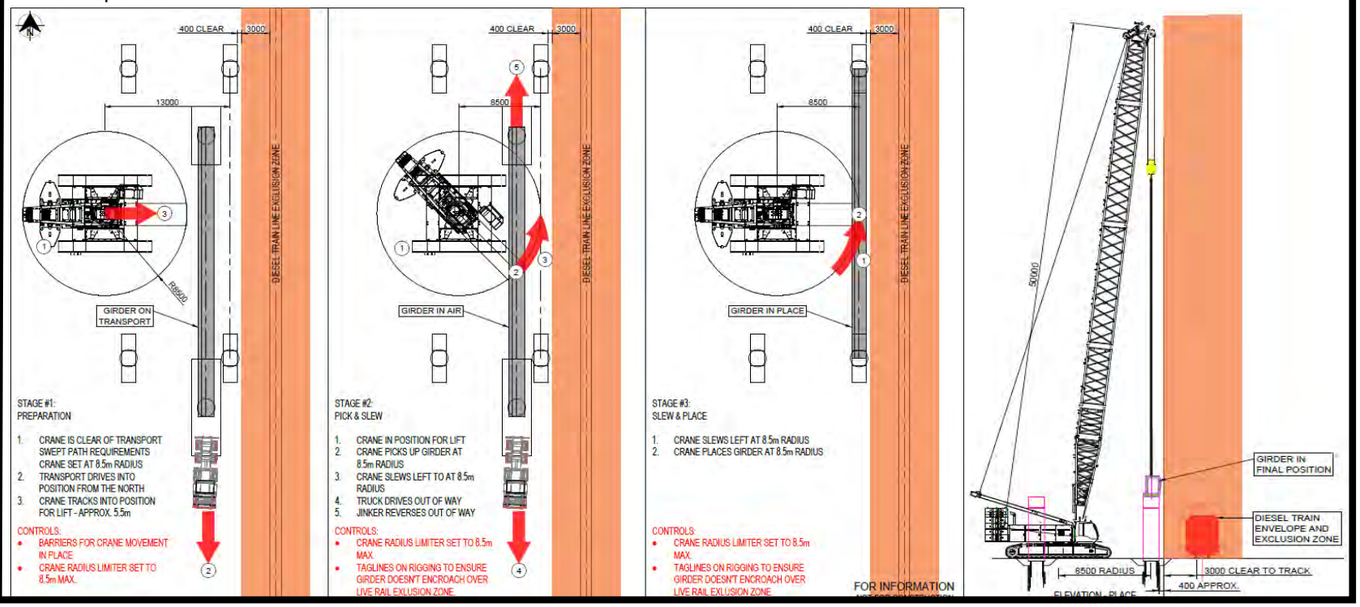
***CHECKS REQUIRED –**

- Check Precast Plank Weight for Span 36 and confirm crane capacity is sufficient (Prior to install of Beam BN36-W)

Precast Installation:

Installation of x3 precast beams – (BN36-E = 149.3T, BN36-CW = TBC, BN36-W = 150T) – **Dual Lift**

Installation of x20 Precast Planks
- Plank Span 34
- Plank Span 35



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CHURCH AVENUE POSSESSION WORKS – Beam Installation (Stage 12)
(Beam Install - Pier 33-35)

MetCONNX

Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

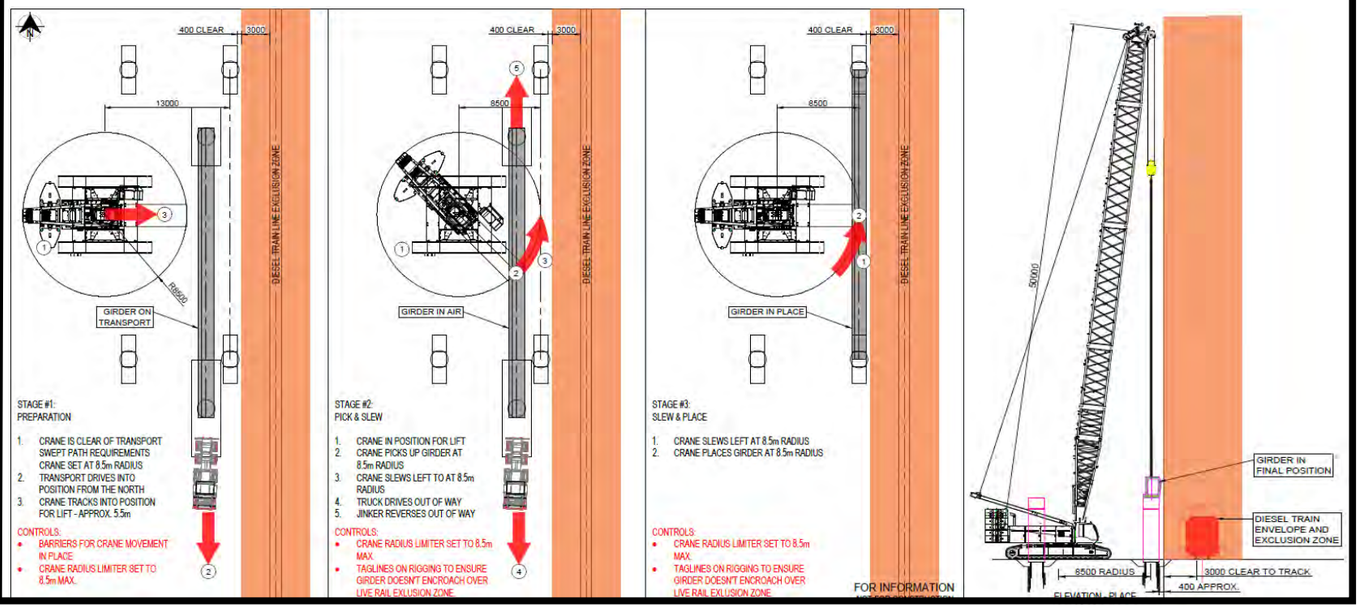
***CHECKS REQUIRED –**

- Beam delivery Truck Path Plan Required

Precast Installation:

Installation of x4 precast beams – (BN35-CW = 114.3T, BN35-W = 114.4T, BN34-CW = TBC, BN34-W = TBC)

Installation of x20 Precast Planks
- Plank Span 36



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CHURCH AVENUE POSSESSION WORKS – Beam Installation (Stage 13)
(Beam Install - Pier 36-38)

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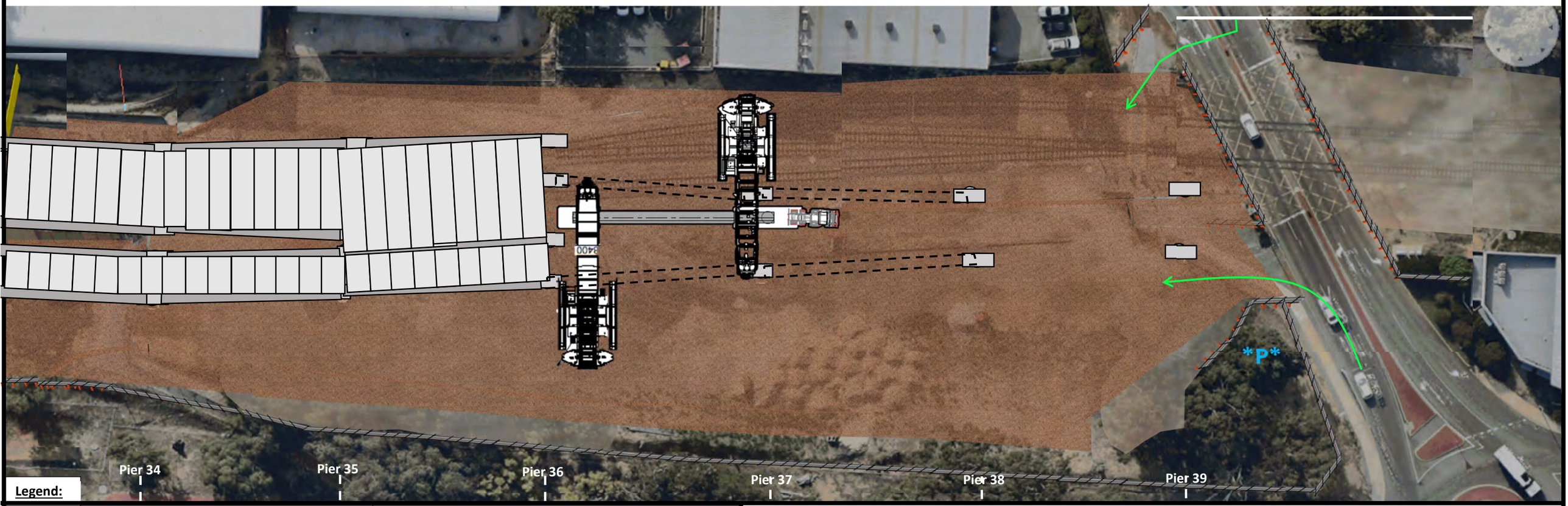


Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

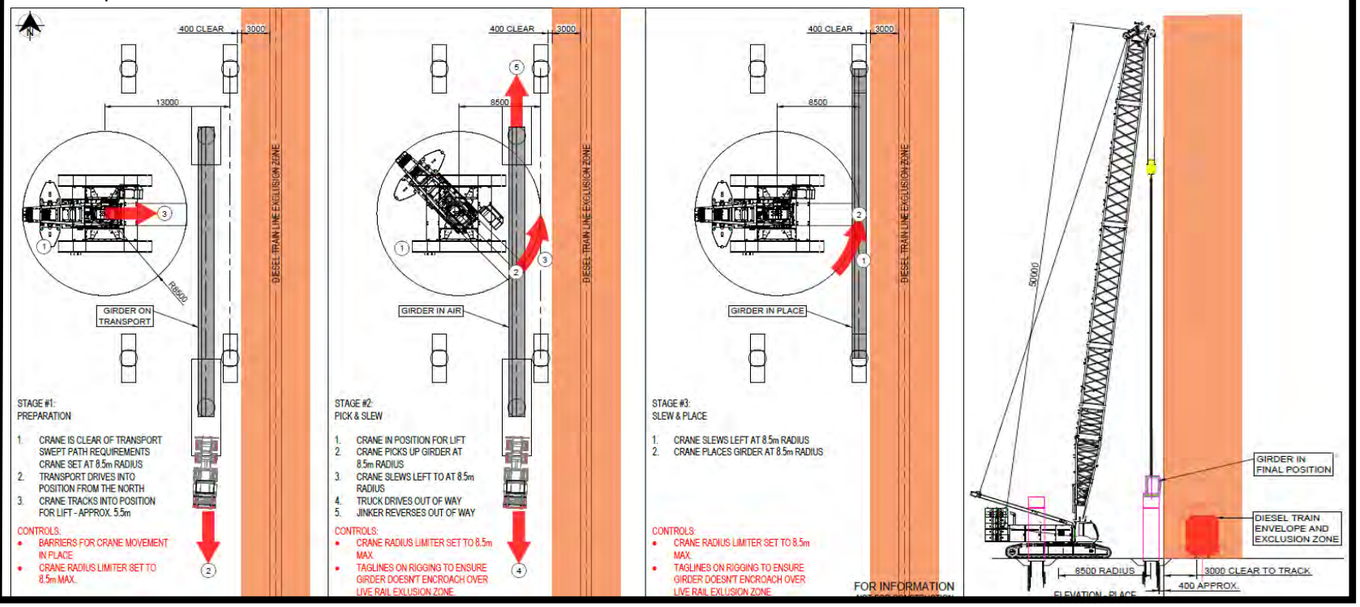
***CHECKS REQUIRED –**

- Beam delivery Truck Path Plan Required

Precast Installation:

Installation of x4 precast beams – (BN37-E = 134.08, BN37-W = 139.62T, BN38-W = 113.9T, BN38-E = 113.3)

Installation of x20 Precast Planks
- Plank Span 34
- Plank Span 35



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CHURCH AVENUE POSSESSION WORKS – Beam Installation (Stage 14)
(Beam Install - Pier 38-39)

MetCONNX

Legend:

-	Pile/Crane Pad – Extension	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

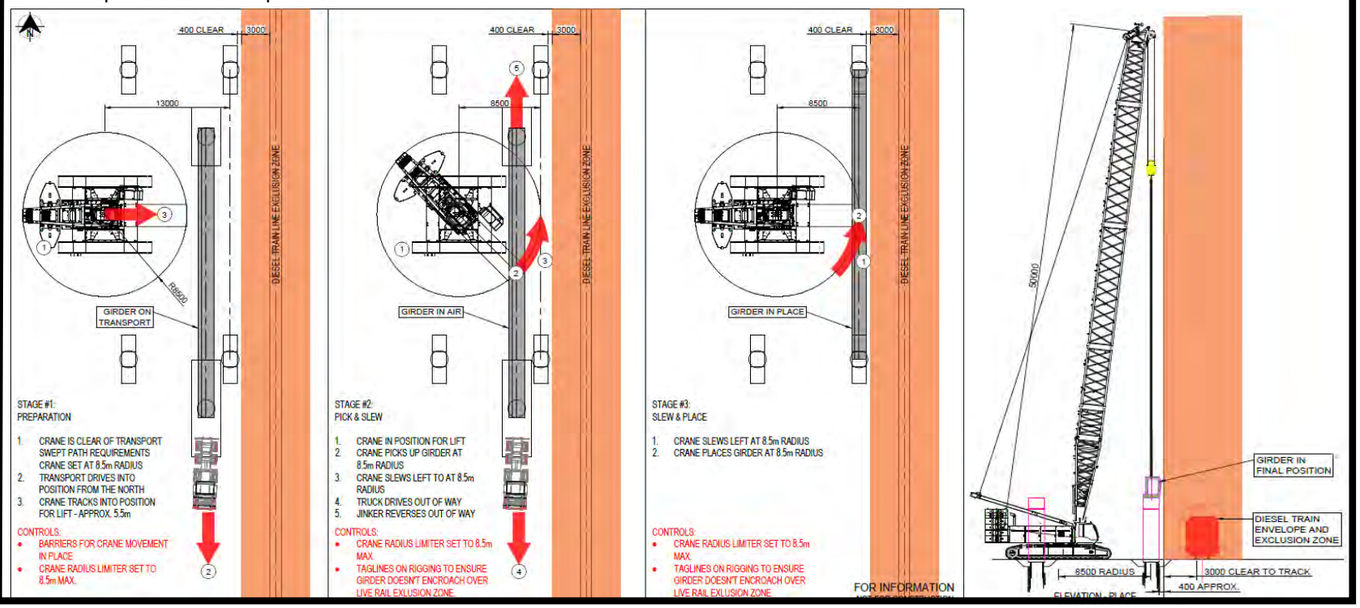
***CHECKS REQUIRED –**

- Beam delivery Truck Path Plan Required

Precast Installation:

Installation of x2 precast beams – (BN39-E = 122.6T, BN39-W = 122.6T)

Installation of x30 Precast Planks
- Plank Span 37
- Plank Span 38 & Plank Span 39



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HOBBS DRIVE EARLY WORKS – Tree Removal (Stage 1)
(Temporary Fencing / Service Management / Pedestrian Management)

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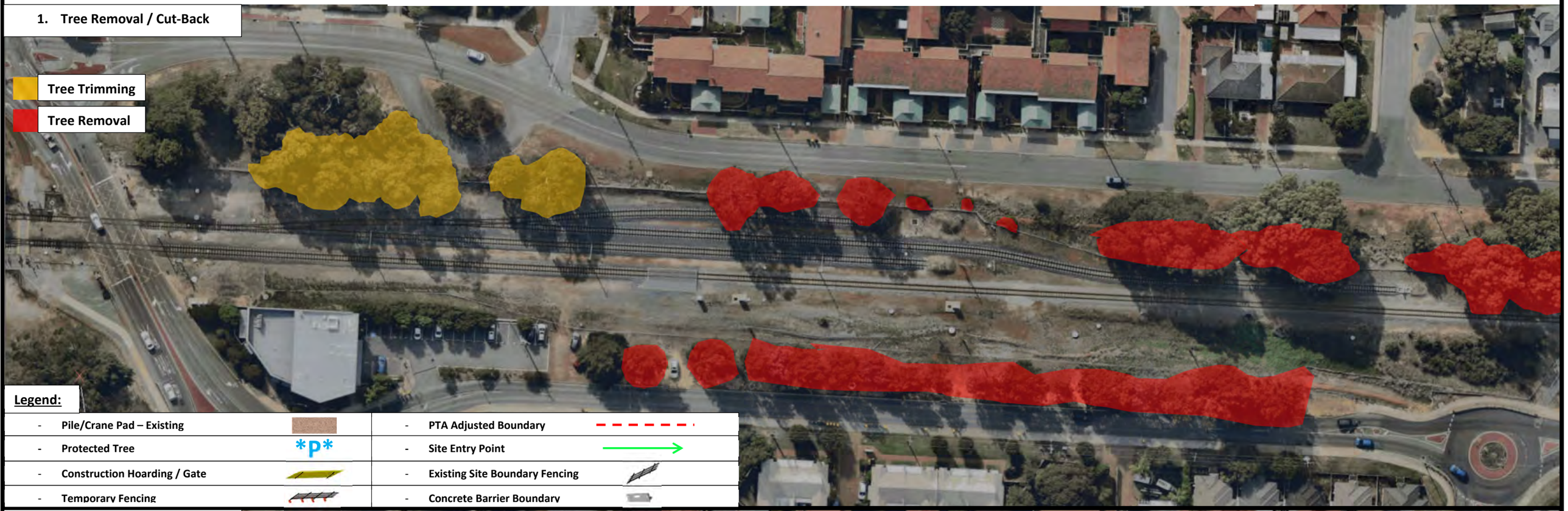
1. Tree Removal / Cut-Back



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

2. Site Boundary Modifications

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HOBBS DRIVE POSSESSION WORKS – Rail Demolition (Stage 2)
(Removal of All Rail Assets)

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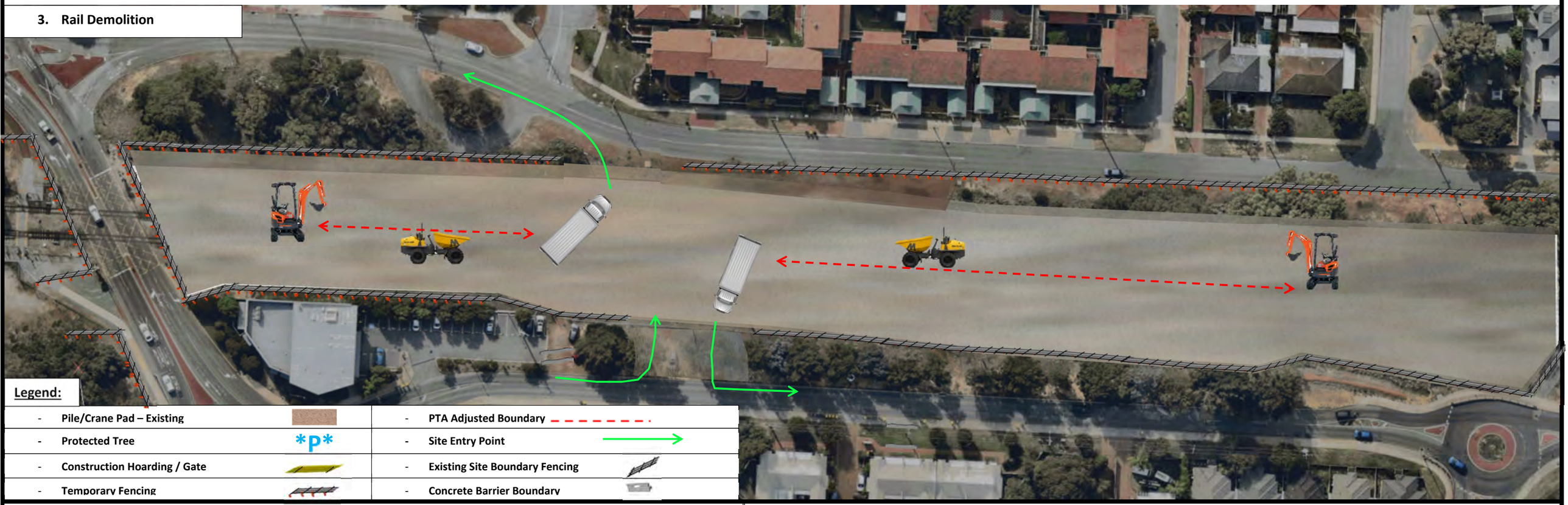
3. Rail Demolition



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Rail Demolition:

- Decommission / Remove all Rail electrical / Coms Assets

- Disassemble / Remove Rail Structure – Rails / Sleepers / Overheads / Ballast

Geotechnical Testing :

- Subgrade to be tested during demolition stage to allow for finalization of crane pad design simultaneously.

Rail Demolition Notes:

HOBBS DRIVE POSSESSION WORKS – Piling / Crane Pad Construction (Stage 3)
(Crane Pad Construction)

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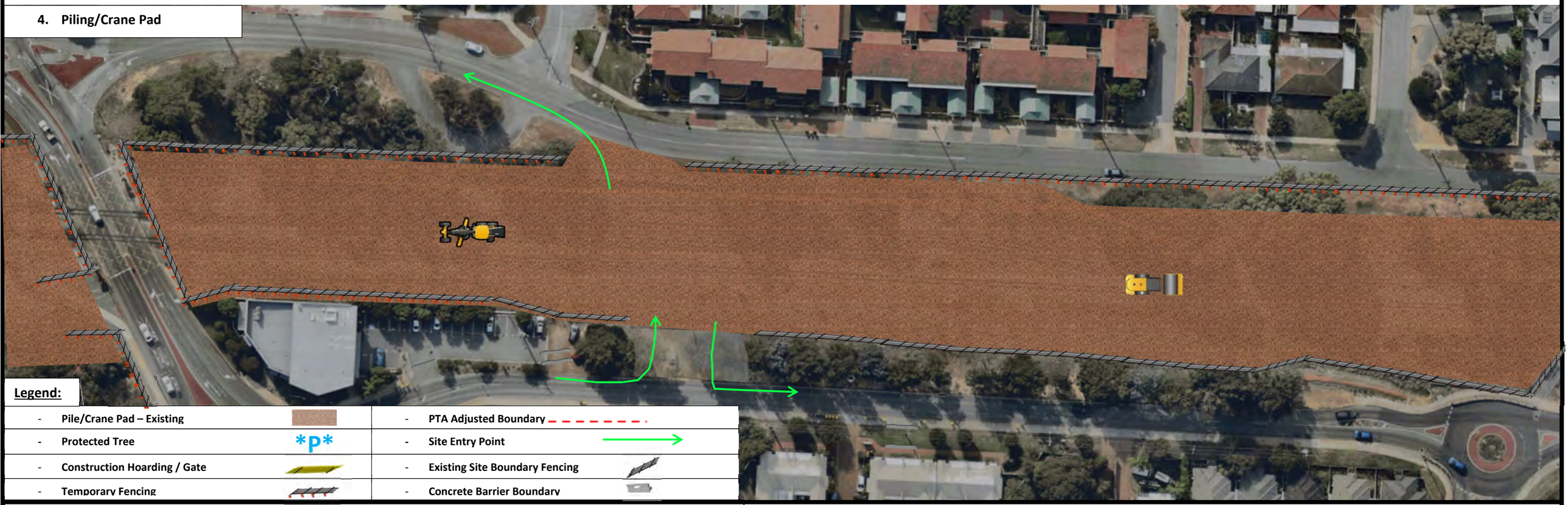
4. Piling/Crane Pad



Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *p*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Mobilization of Plant and Materials:

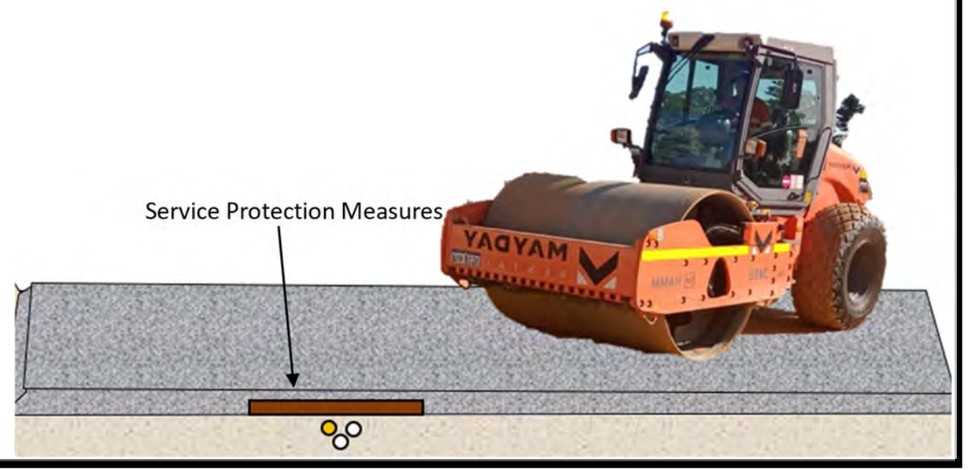
- All plant & material deliveries shall occur via western Gate 12

Services Relocation / Protection:

- All PTA services (Previous soft clashes) should be removed during the demolition stage.
- Any remaining service assets in this location will need to be identified / considered (Known Telstra line in area – Plan to be clarified and any other clashes determined)

Crane / Piling Pad Construction:

- Assessment of existing ground conditions to take place to inform design
- Crane / Piling pad design to be completed for this zone considering the largest expected loads during future cranage operation
- All service protection requirements to be established prior to / during works.



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HOBBS DRIVE POSSESSION WORKS – Piling Works (Stage 4)
(Piling)

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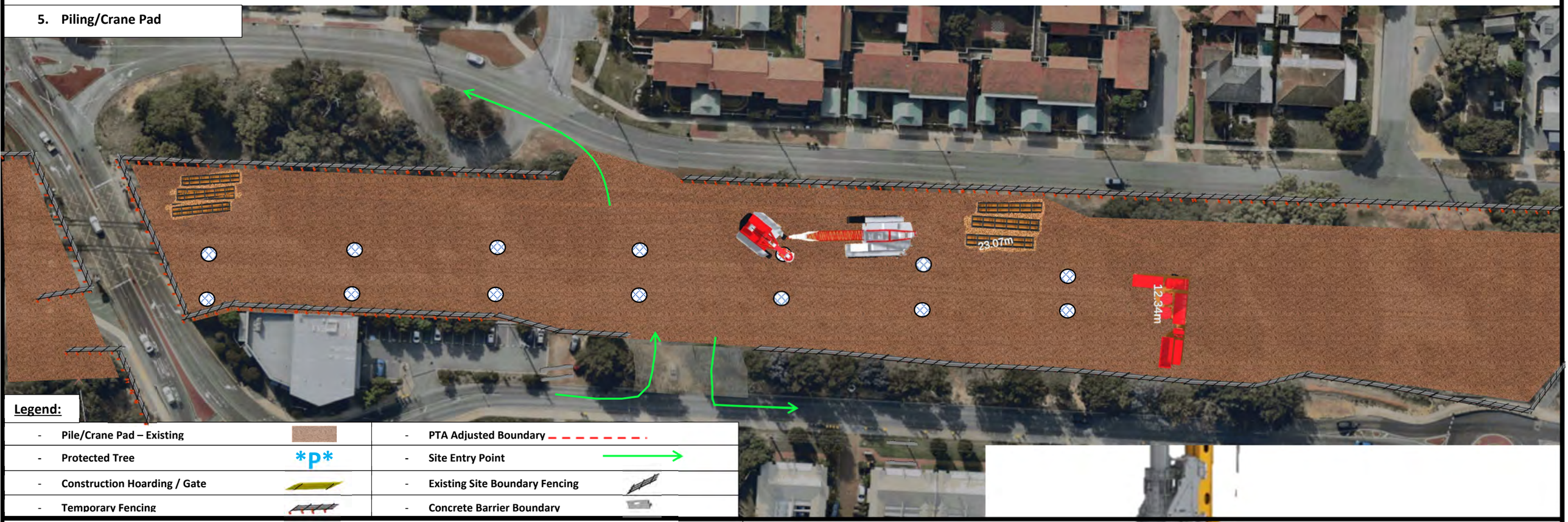
5. Piling/Crane Pad



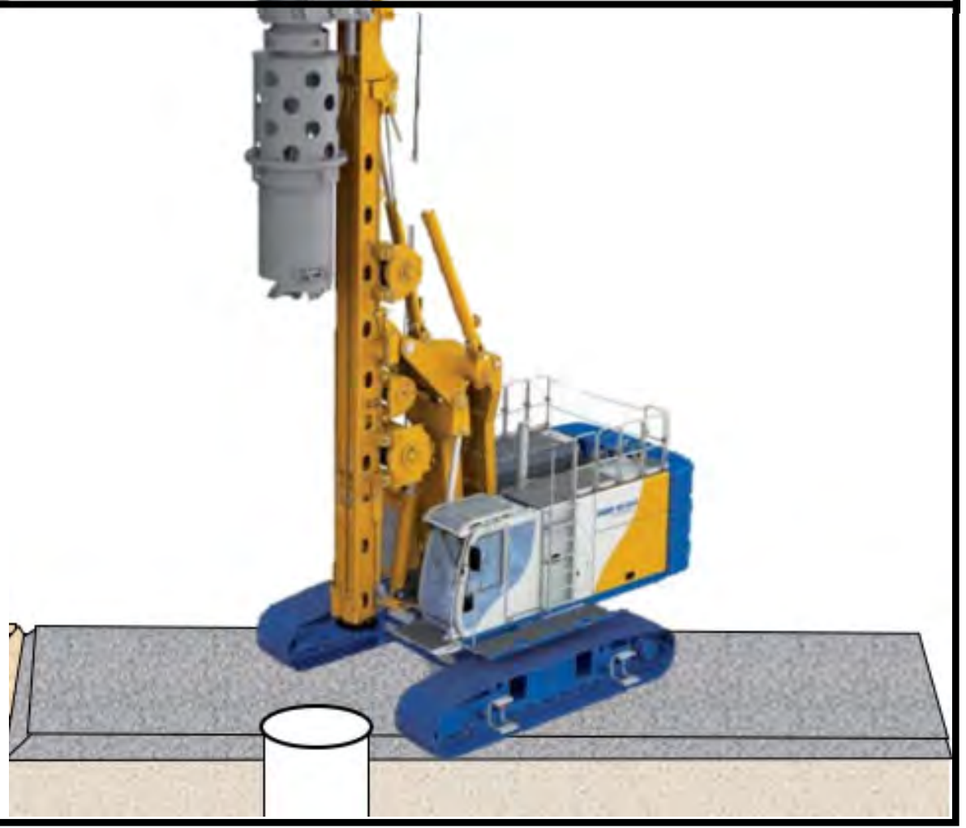
Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree *P*	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Piling Notes:

Piling Works:

- Completion of x14 Piles
  - Bore
  - Install Reo Cage
  - Concrete Pour



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HOBBS DRIVE POSSESSION WORKS– Column Erection (Stage 5)
(Column & Headstock Install - Pier 40-Abt2)

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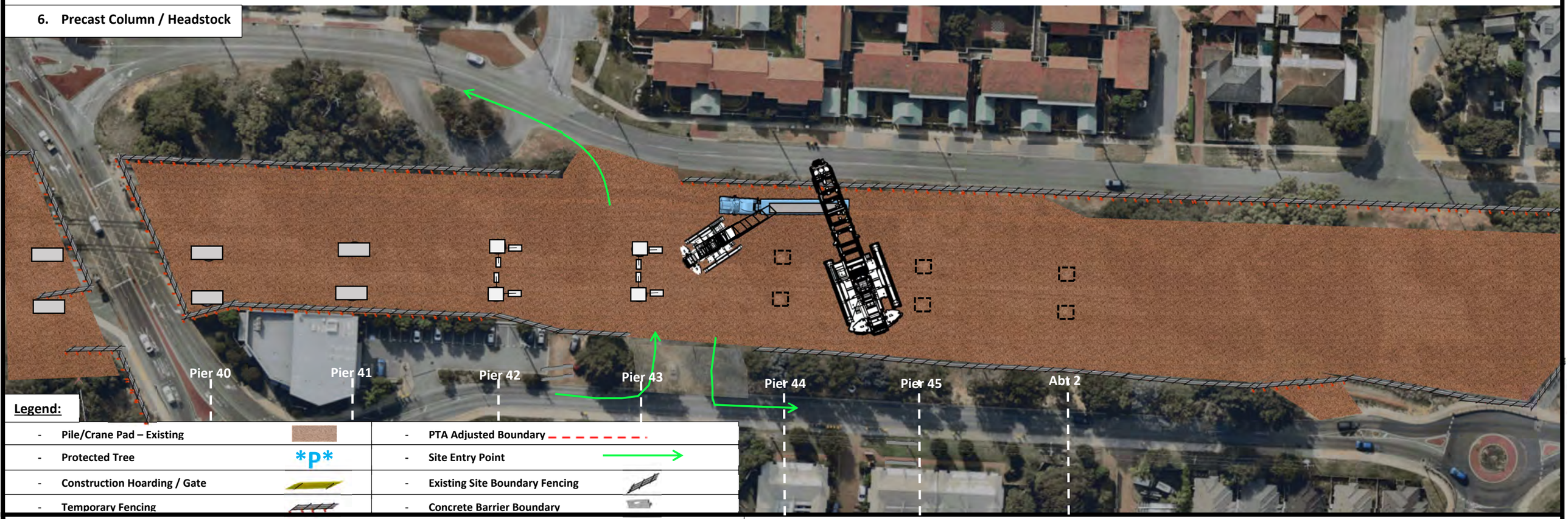
6. Precast Column / Headstock



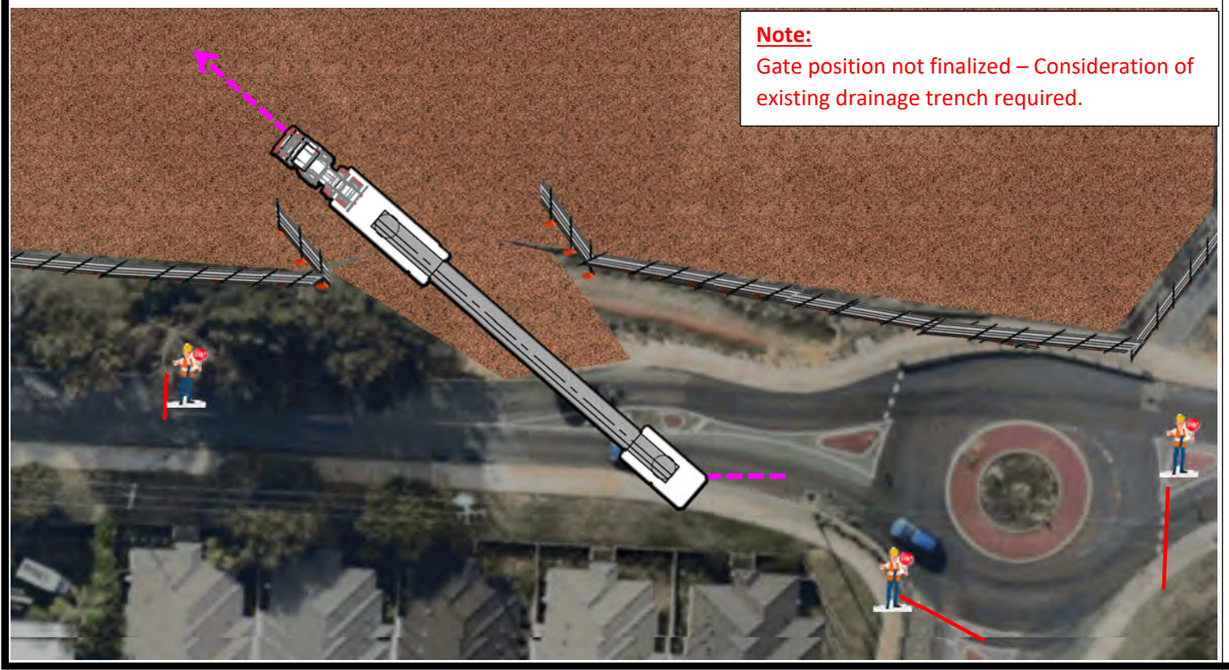
Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries / Alternative delivery route:

- Due to current gate locations proximity to viaduct construction location, there may be stages during construction that these gates need to remain inaccessible – (Temporary support of precast staging)

Alternative route may be required for oversized loads during this stage.



Note:
Gate position not finalized – Consideration of existing drainage trench required.

Precast Installation:

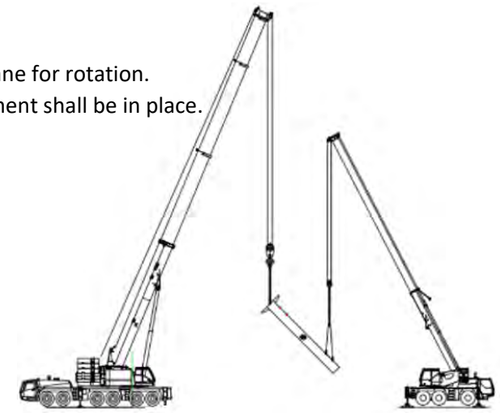
Installation of x14 Columns & x 14 Headstocks - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to site boundary – spotters / pedestrian management shall be in place.

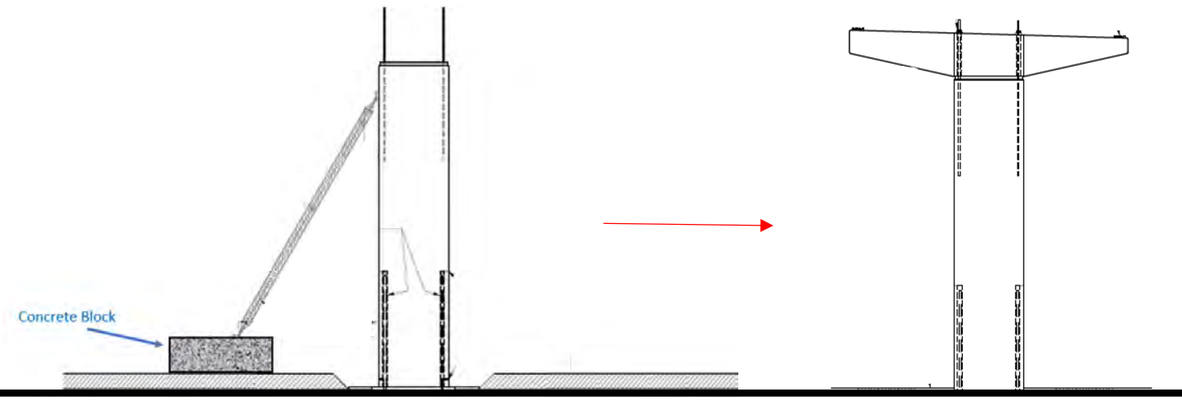
Stage A :

- Install Columns Pier 40 / Pier 41 (Shift 1)
- Grout for Pier 40 / Pier 41 (Shift 1 / Shift 2)
- Install Columns Pier 42 / Pier 43 (Shift 2)

Stage B :

- Install Headstocks Pier 40 / Pier 41 (Shift 3) – after confirming grout strength
- Commence FRP headstock connection detail construction.
- Install Columns Pier 44 / Pier 45 (Shift 4)
- Install Columns Pier Abt 2 (Shift 5)





HOBBS DRIVE POSSESSION WORKS – Beam Installation (Stage 6)
(Beam Install - Pier 40-Abt2)

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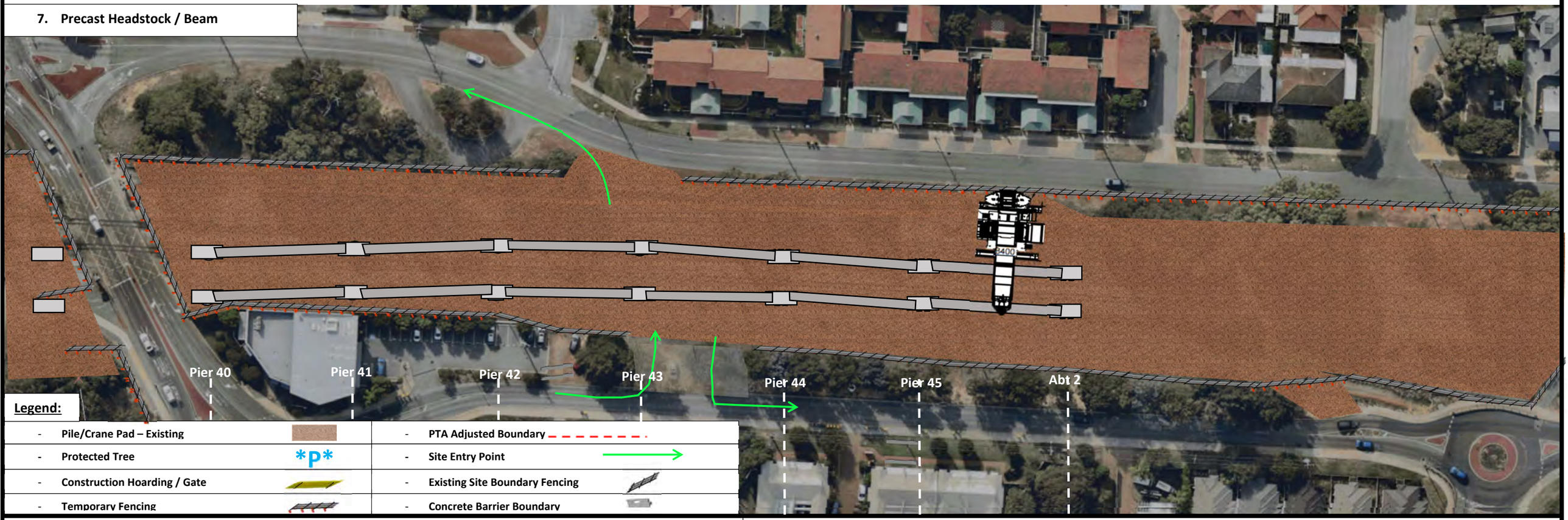
7. Precast Headstock / Beam

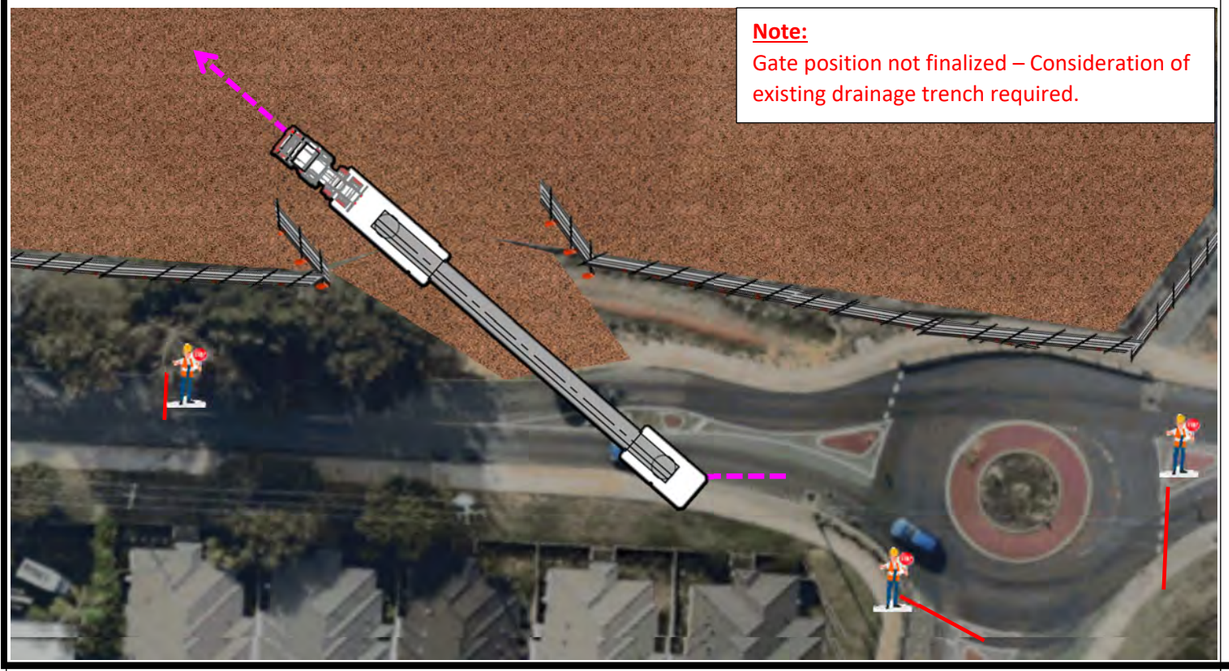


Legend:

-	Pile/Crane Pad – Existing	-	PTA Adjusted Boundary
-	Protected Tree	-	Site Entry Point
-	Construction Hoarding / Gate	-	Existing Site Boundary Fencing
-	Temporary Fencing	-	Concrete Barrier Boundary

Oversize Deliveries / Alternative delivery route:

- Due to current gate locations proximity to viaduct construction location, there may be stages during construction that these gates need to remain inaccessible – (Temporary support of precast staging)
Alternative route may be required for oversized loads during this stage.



Note:
Gate position not finalized – Consideration of existing drainage trench required.

Precast Installation:

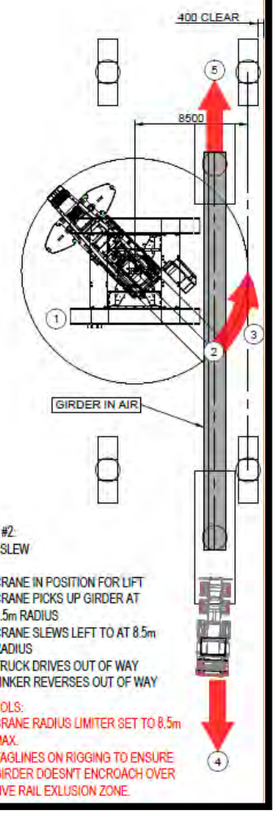
Installation of x14 Columns & x 14 Headstocks - Columns shall utilize a secondary crane for rotation.
Where lifts are occurring adjacent to site boundary – spotters / pedestrian management shall be in place.

Stage C :

- Install Headstocks Pier 42 / Pier 43 (Shift 6)
- Confirm headstock connection strength achieved Pier 40/41 (Shift 6)
- Grout pour Pier 44 / 45 / Abt 2 (Shift 5 / Shift 6)
- Installation of x2 precast beams – (BN41-W = 139.3T, BN41-E = 139.4T) – **Potential dual lift* Check** (Shift 7)
- Install Headstocks Pier 44 / Pier 45 / Abt 2 (Shift 8/9)

Stage D :

- Confirm headstock connection strength achieved Pier 41/42 (Shift 10)
- Installation of x2 precast beams – (BN42-W = 139.2T, BN42-E = 139.2T) – **Potential dual lift* Check**
- Confirm headstock connection strength achieved Pier 42/43 (Shift 11)
- Installation of x2 precast beams – (BN43-W = 117.5T, BN43-E = 117.4T) – **Potential dual lift* Check**
- Confirm headstock connection strength achieved Pier 43/44 (Shift 12)
- Installation of x2 precast beams – (BN44-W = 138.6T, BN44-E = 138.6T) – **Potential dual lift* Check**
- Confirm headstock connection strength achieved Pier 44/45 (Shift 13)
- Installation of x2 precast beams – (BN45-W = 133.8T, BN45-E = 133.8T)
- Confirm headstock connection strength achieved Pier 45/46 (Shift 14)
- Installation of x2 precast beams – (BN46-W = 124.6T, BN46-E = 124.5T)



HOBBS DRIVE POSSESSION WORKS – Special Beam Install (Stage 7)
(Beam Install - Pier 39-40)

Construction Staging – Concept
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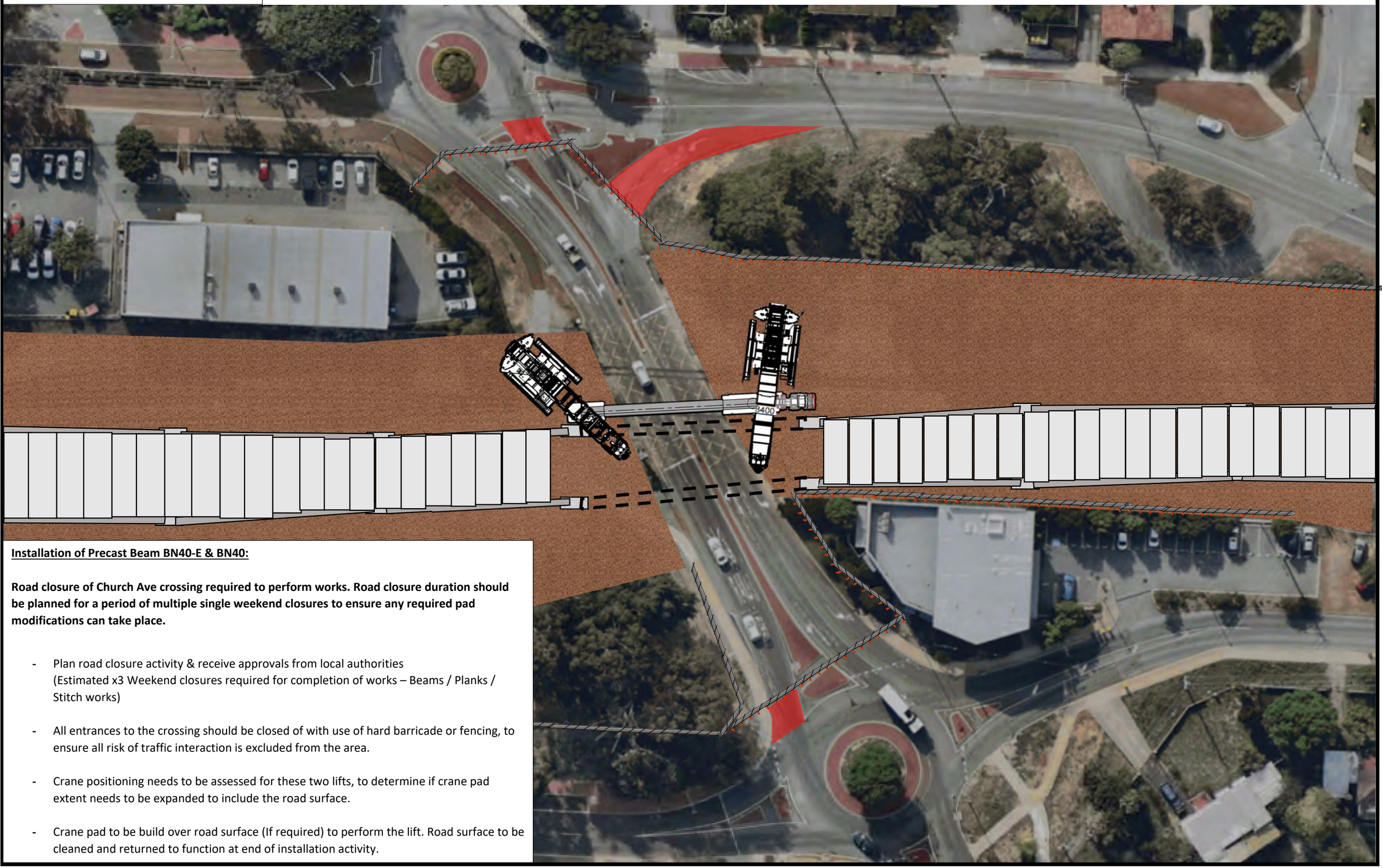
8. Road Closure / Beam Install



Installation of Precast Beam BN40-E & BN40:

Road closure of Church Ave crossing required to perform works. Road closure duration should be planned for a period of multiple single weekend closures to ensure any required pad modifications can take place.

- Plan road closure activity & receive approvals from local authorities (Estimated x3 Weekend closures required for completion of works – Beams / Planks / Stitch works)
- All entrances to the crossing should be closed of with use of hard barricade or fencing, to ensure all risk of traffic interaction is excluded from the area.
- Crane positioning needs to be assessed for these two lifts, to determine if crane pad extent needs to be expanded to include the road surface.
- Crane pad to be build over road surface (If required) to perform the lift. Road surface to be cleaned and returned to function at end of installation activity.