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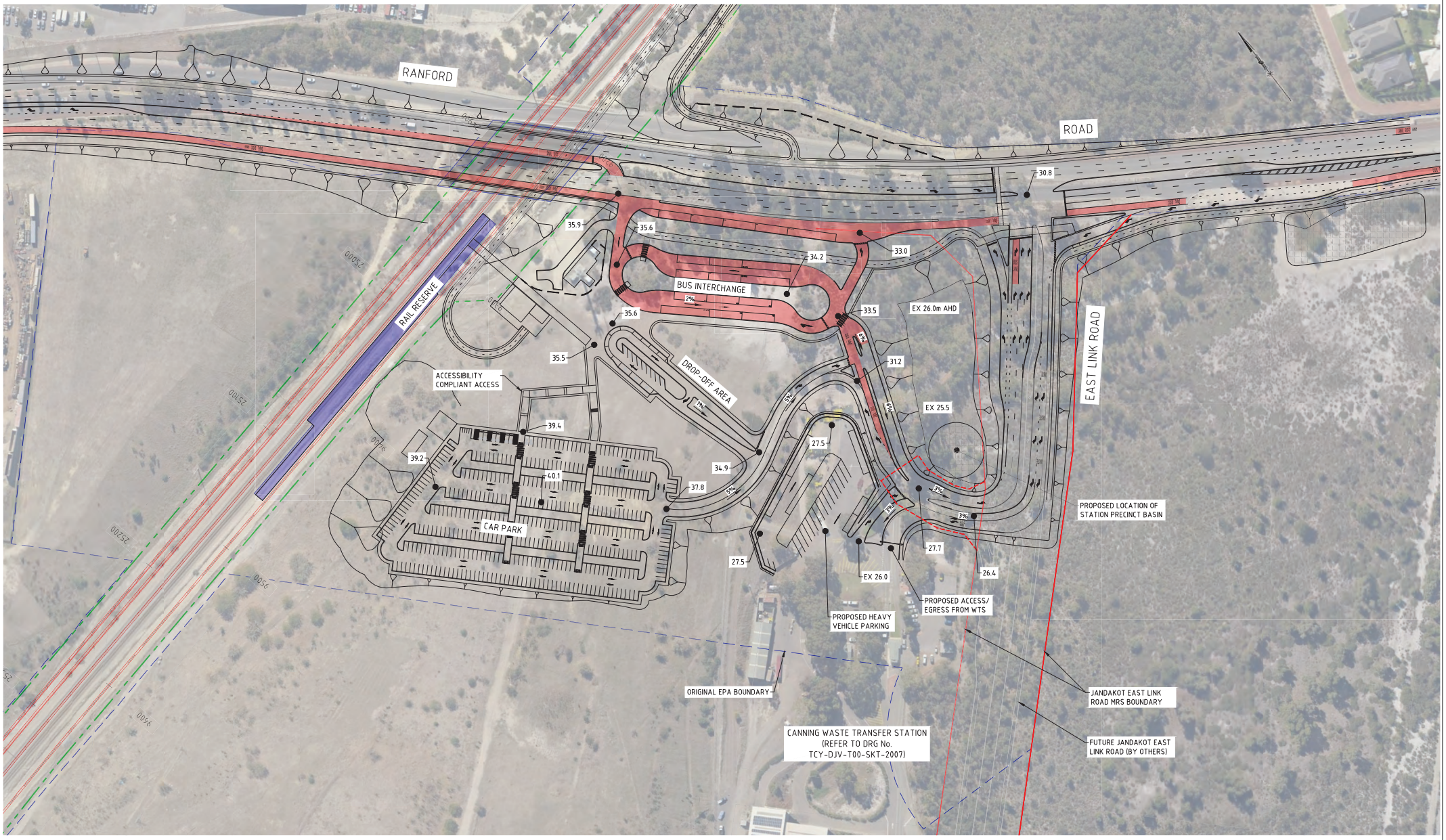
Appendix A – Development proposals/existing gas extraction system

NOTES

1. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
2. ALL SPOT LEVELS ARE IN mAHD.



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SCALE (m) 1:1000 (A1) ; 1:2000 (A3)

CONCEPT DESIGN

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C	11.03.2020	RE-ISSUED FOR INFORMATION	DR	GC	DP	BS
B	13.02.20	RE-ISSUED FOR INFORMATION	DR	GC	DP	BS
A	21.01.20	ISSUED FOR INFORMATION	DR	GC	DP	BS

ORIG SIZE A1

0 10 20 30 40 50 100mm
AT ORIGINAL PLOT SIZE

NEWest Alliance

TCY-DJV-T00-CI-SKT-2006

REFERENCES
TCY-DJV-T00-CI-REF-BDY-EPA
TCY-DJV-T00-CI-REF-BRIDGES
TCY-DJV-T00-CI-REF-CAD
TCY-DJV-T00-CI-REF-BDY-RAIL
TCY-DJV-T00-CI-REF-RAIL
TCY-DJV-T00-CI-REF-AER-TCL
TCY-DJV-TSC-CI-REF-DES
TCY-DJV-TLC-TR-REF-PLATFORMS-PCG20
TCY-DJV-TLC-TR-REF-TRACKWORK-PCG20
TCY-DJV-TKC-TR-REF-TRACKWORK-PCG20
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TCY-DJV-TSC-CI-REF-JELR

SCALE : 1:1000 (@ A1)
DATUM : HORIZONTAL: PCG94 VERTICAL: AHD71
PTA ACCEPTANCE STAMP

DESIGNED DP
DRAWN GC
CHECKED BS
APPROVED FOR ISSUE
EXECUTIVE DIRECTOR PTA Division / External Company
DATE

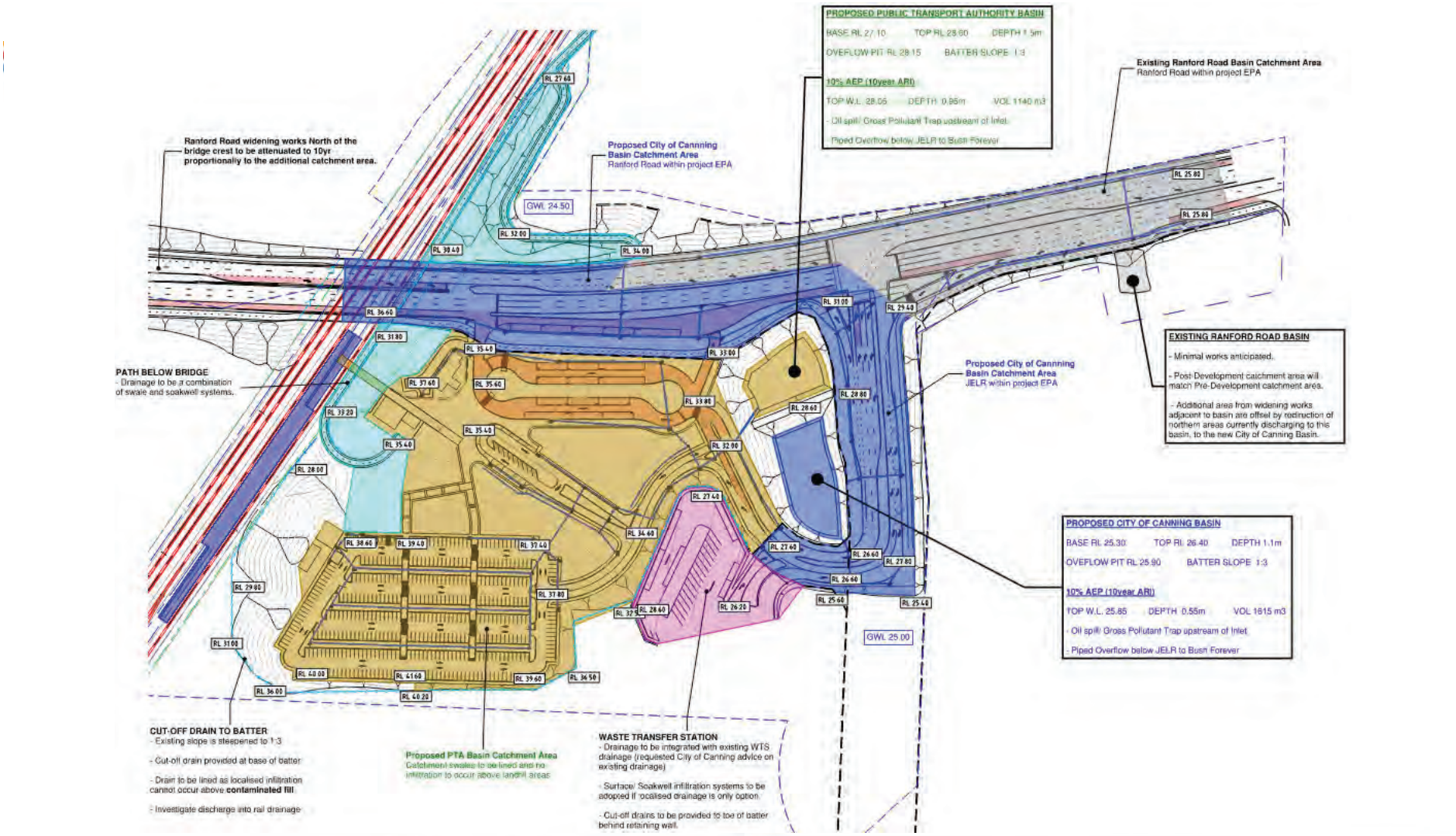
Government of Western Australia Public Transport Authority
METRONET

THORNLIE COCKBURN LINK
RANFORD RD STATION CAR PARK & BUS INTERCHANGE
PLAN - OPTION B

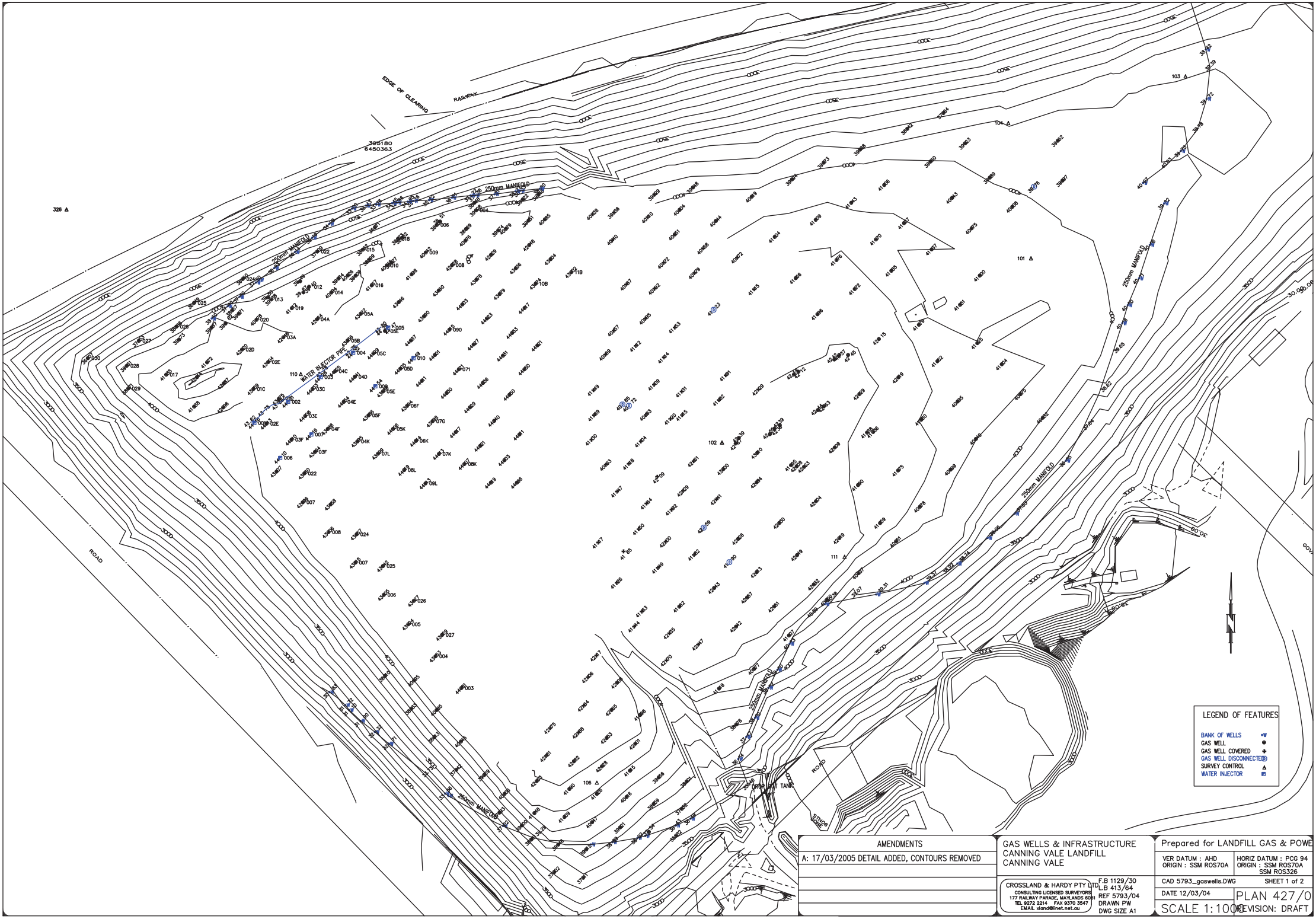
PTA Drawing No:
REV : C

CAD DRAWING PATHNAME K:\Engineering & Design\EDD1 Draft Documentation\01_DJV\TCL\CI\08_SKT\TCY-DJV-T00-CI-SKT-2006.dwg

Ranford Road – Drainage Concept



NEWest Alliance
GROWING PERTH'S JOBS AND COMMUNITIES



AMENDMENTS
A: 17/03/2005 DETAIL ADDED, CONTOURS REMOVED

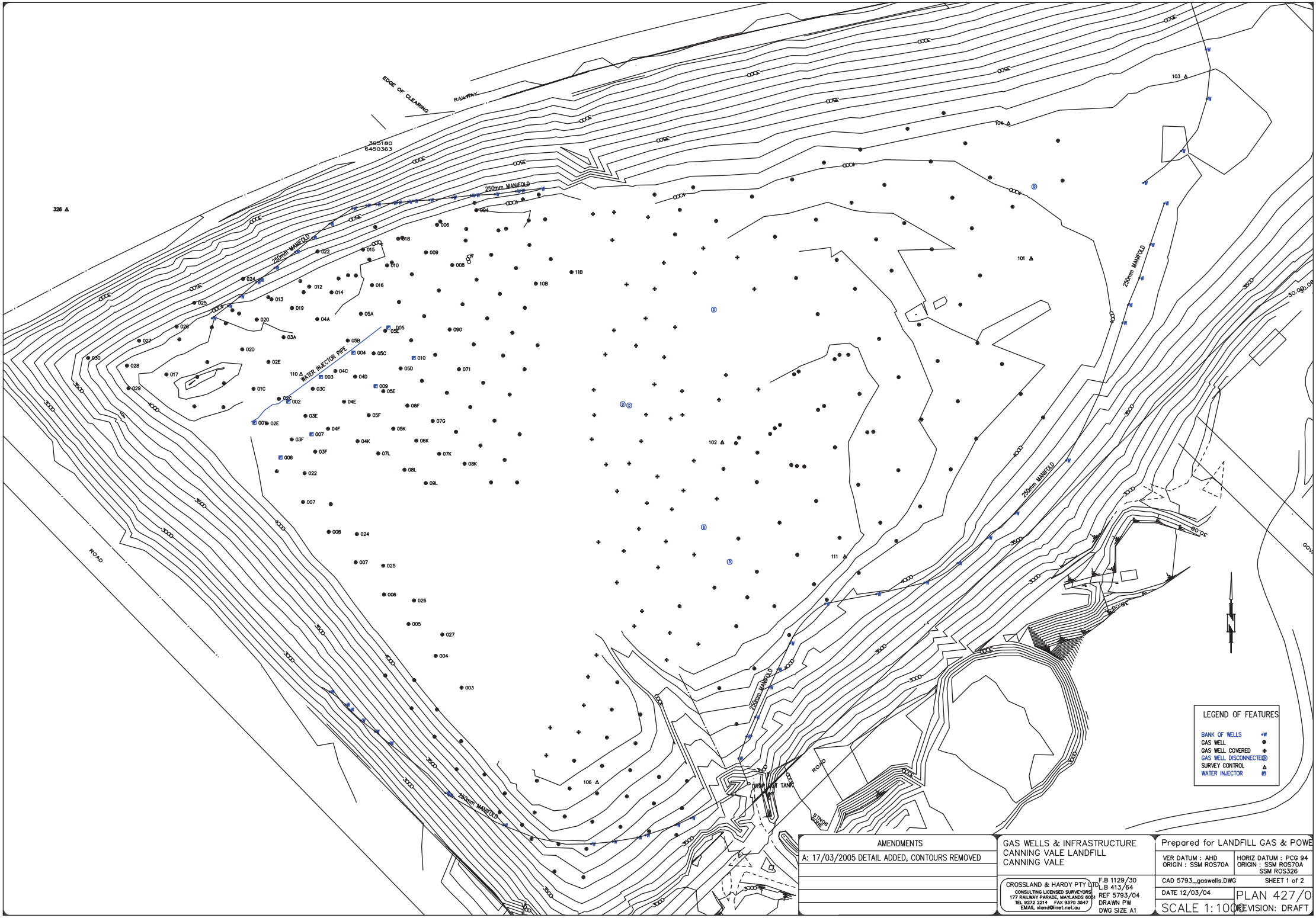
GAS WELLS & INFRASTRUCTURE
CANNING VALE LANDFILL
CANNING VALE

CROSSLAND & HARDY PTY LTD
CONSULTING LICENSED SURVEYORS
177 RAILWAY PARADE, MAYLANDS 6051
TEL 9272 2214 FAX 9370 3547
EMAIL xlandc@iinet.net.au

F.B 1129/30
L.B 413/64
REF 5793/04
DRAWN PW
DWG SIZE A1

Prepared for LANDFILL GAS & POWE

VER DATUM : AHD ORIGIN : SSM ROS70A	HORIZ DATUM : PCG 94 ORIGIN : SSM ROS70A SSM ROS326
CAD 5793_gaswells.DWG	SHEET 1 of 2
DATE 12/03/04	PLAN 427/0
SCALE 1:1000	REVISION: DRAFT



AMENDMENTS
A: 17/03/2005 DETAIL ADDED, CONTOURS REMOVED

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VER DATUM : AHD ORIGIN : SSM ROS70A	HORIZ DATUM : PCG 94 ORIGIN : SSM ROS70A SSM ROS326
CAD 5793_gaswells.DWG	SHEET 1 of 2
DATE 12/03/04	PLAN 427/0
SCALE 1:1000	REVISION: DRAFT

Appendix B - Risk matrix

Consequence Descriptors

Potential Consequence[i]	
Classification	**Description**
Catastrophic	Human Health: Acute irreversible damage to human health for large population. Environment: Potentially lethal to regional ecosystem or threatened species, widespread lethal on-site and off-site local impacts. Property: Irreparable damage to property such as buildings or infrastructure/ permanent loss of use.
Major	Human Health: Chronic, irreversible damage to human health and/or acute non-permanent health effects upon human health for small population Environment: Potentially lethal to local ecosystem, widespread harmful on site and off site impacts. Property: Damage to property such as buildings or infrastructure resulting in heavily disrupted use or loss of use in medium term and requiring extensive and intensive repairs.
Moderate	Human Health: Non-permanent or easily preventable effects upon human health (for large population) and/or potentially chronic effects to human health (for small population). Environment: Potentially harmful to regional ecosystem with local harmful impacts primarily contained on site. Property: Damage to property such as buildings or infrastructure, possible short term disruption to use and locally intensive repairs.
Minor	Human Health: Non-permanent or easily preventable effects upon human health (for small population). Environment: Potentially harmful to local ecosystem with local harmful impacts contained on site. Property: Easily repairable defects/non-structural damage/cosmetic impact only to property such as buildings or infrastructure.
Negligible	No discernable impact, or inconsequential in nature.

Probability Descriptors

Probability[i]	
Classification	**Description**
Almost Certain	Is expected to occur with a probability of multiple occurrences within a year.
Likely	Will probably occur within a 5-10 year period.
Possible	Might occur or should be expected to occur within a 5-10 year period.
Unlikely	Could occur within 20 years, or in unusual circumstances.
Rare	May occur only in exceptional circumstances (e.g. once in 100 years).

Risk Classification Matrix

Risk Classification[i]						
		Consequence				
		Negligible	Minor	Moderate	Major	Catastrophic
Probability	Rare	Very Low	Very Low	Low	High	High
	Unlikely	Very Low	Low	Moderate	High	Very High
	Possible	Very Low	Low	Moderate	High	Very High
	Likely	Low	Moderate	High	Very High	Very High
	Almost Certain	Low	Moderate	High	Very High	Very High

Description of Risks and Likely Action Required[i]

Very High Risk	The probability of harm to a relevant receptor is at least likely and consequences would be moderate or worse. Urgent action is likely to be required.
High Risk	The probability of harm to a relevant receptor is at least likely with moderate consequences. At worst, the probability of catastrophic consequences is rare. Urgent action may be required in the short term and action is likely to be required in the long term.
Moderate Risk	The probability of harm to a relevant receptor is at least likely with minor consequences. At worst, the probability of major consequences is rare. Action may be required in the short term or long term.
Low Risk	The probability of harm to a relevant receptor is at least likely although consequences would be negligible and at worst, the probability of moderate consequences is rare. Action unlikely to be required or will be limited in nature/extent/duration.
Very Low Risk	There is a low probability only that harm could occur to a relevant receptor with negligible consequences and at worst, the probability of a minor consequence is rare. No action required.

Action: Further assessment (e.g. site investigation, detailed quantitative risk assessment), or intervention, (e.g. remediation, mitigating measures).

[i] Based on guidance presented in:

1. Department of Environment and Conservation (2006) *The Use of Risk Assessment in Contaminated Site Assessment and Management*.
2. Standards Australia/Standards New Zealand Standard Committee, *AS/NZS ISO 31000:2009, Risk Management-Principles and Guidelines*, November 2009.
3. International Electrotechnical Commission, *International Standard, ISO/ IEC 31010:2009, First Edition*, 2009.
4. Department of Health WA (2011) *Guidelines for the Non-potable Uses of Recycled Water in Western Australia*.

Appendix C - Sampling and analysis quality plan

1. Sampling and analysis quality plan

Monitoring requirements at the Site will be addressed through implementation of a SMP-specific Sampling and Analysis Quality Plan (SAQP). The purpose of the SAQP is to outline the proposed sampling approach and methodologies in order to appropriately validate the appropriateness and effectiveness of the proposed management measures with respect to the development of the Ranford Road Metronet Station site.

The SAQP provides:

- The Data Quality Objectives (DQOs) for the SMP monitoring program.
- The monitoring and sampling methodologies to be adopted.
- Sampling locations.
- The field and laboratory analytical schedule.
- The Quality Assurance (QA)/Quality Control (QC) program.

Additional information in relation to the proposed sampling and analytical approach is provided in the SMP for each relevant stage of the development requiring management/monitoring.

1.1 Data quality objectives

Development of DQOs for the SMP monitoring requirements is based on guidance presented in the *ASC NEPM*.

The DQO process comprises the following seven steps:

- Step 1: State the problem
- Step 2: Identify the principal study question
- Step 3: Inputs to the decision
- Step 4: Boundaries of the study
- Step 5: Decision rules
- Step 6: Tolerable limits on decision errors
- Step 7: Optimisation of the data collection process

A summary of the DQO process for this investigation is presented below in Table 1.

Table 1 Data quality objectives

DQO	Sub-item	Description
Step 1: State the Problem	Problem description	The Site is a former landfill and is currently classified as '*Contaminated – remediation required'* under the *Contaminated Sites Act 2003* (the Act). Groundwater has previously been well characterised, including temporal data. Previous groundwater investigations demonstrate low risk to potential receptors with respect to groundwater impacts. Notwithstanding this, confirmation of groundwater quality is required to provide updated pre-development baseline conditions and validate the current understanding of groundwater conditions beneath and surrounding the site. With respect to ground gases within the landfill waste mass, onsite gas generation and migration characteristics concentrations are likely subject to change from proposed development activities. Development of the Site as a train station (if not managed appropriately) may increase the site risk profile and pose an unacceptable risk to identified receptors. Appropriate site management during development is therefore required to avoid, mitigate or manage potential negative impacts on the migration of existing contamination (soil, groundwater, and ground gas) associated with the development and operation of the Ranford Road Metronet Station site.
	Identify members of the planning team	The project team structure is outlined below: • Client: Public Transport Authority (PTA) • Contractor (NEWest Alliance) • Environmental Consultant: TBC and/or as appointed by NEWest Alliance. • Contaminated Sites Auditor: Nicholas Owen (Prensa Pty Ltd) / Mr Andrew Lau (JBS&G) all subsequent documents including updates to the SMP
	Develop the conceptual site model (CSM)	The CSM is provided in Section 1.4 of the SMP. The CSM will be updated as required, as additional data and information becomes available.
	Specify available resources and constraints	<u>Resources:</u> Environmental consultant to provide and/or contract the necessary resources and suppliers for the work as specified in a proposal. <u>Constraints:</u> Potential constraints to monitoring comprise: • Serviceability and accessibility of existing monitoring installations, some of which lie in land accessible to or in use by other parties or otherwise have uncontrolled access. • Logistical issues associated with undertaking monitoring events under representative weather conditions.

DQO	Sub-item	Description
Step 2: Identify the Decision	Identify the principal study question	Are the management measures sufficient to manage potential impacts of the Ranford Road Metronet Station development and risks to receptors?
	Identify alternative actions that could result from resolving the principal study question	Management measures are sufficient at managing the development. No further action required. Management measures are not sufficient, indicating a potentially unacceptable risk to identified receptors. Further action may be necessary and comprise: • Implementing contingency measures: e.g. short-term management actions and/or undertake additional assessment (including monitoring and/or quantitative risk assessment). • Implementing additional management measures (longer term).
Step 3: Identify the Inputs to the Decision	Identify the information that will be required to resolve the decision	The following inputs are required: • Background information from previous investigations; • Understanding of the geology, hydrogeology and topography of the Site. • Ranford Road Metronet Station site development information. • Field landfill gas and vapour data, targeting methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, atmospheric pressure, gas flow; and volatile organic compounds. • Field conditions (visual observations) • Chemical concentrations of targeted analytes.
	Determine the sources for each item of identified information	The following sources of information will be required: • Previous site investigation reports. • Field and laboratory data, as defined in the SMP. • Proposed development plans for the Ranford Road Metronet Station site, to the extent known at this time.
	Identify the information needed to establish the assessment level	Baseline (pre-construction) monitoring data for landfill gases and vapours, and groundwater. Monitoring data (field and laboratory) collected during, and post, the construction program concerning soil, ground gas, and groundwater.
	Confirm that appropriate analytical methods exist to provide the necessary data	<u>Ground gas:</u> Laboratory analytical methodologies are not required for the ground gas monitoring components, unless the field screening indicates a sample for laboratory analysis is required to address an uncertainty concerning field monitoring data. <u>Soil and groundwater:</u> National Association of Testing Authorities (NATA) accreditation is available for the proposed analysis from the nominated laboratories. Nominated groundwater laboratory limits of reporting will be below the relevant *ASC NEPM* investigation levels.

DQO	Sub-item	Description
Step 4: Define the Study Boundaries	Specify the characteristics that define the population of interest	The population of interest comprises landfill gases and vapours, atmospheric pressure conditions, soil conditions, and groundwater quality. <u>Ground gas:</u> The population of interest comprises landfill gases and vapours and atmospheric pressure conditions. The most commonly occurring contaminants of concern for this former landfill site include methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide and volatile organic compounds. Gas flow also is a characteristic that is used to determine risk of landfill gases and vapours. <u>Soil and groundwater</u> The population of interest comprises levels of CoPC in soil and groundwater within the landfill capping material and groundwater beneath the Site.
	Define the spatial boundaries of the decision	The Site boundary is shown in Figure 1 of the SMP. The vertical extent of the study boundary will extend from surface soils to the base of the landfill waste mass (approximately 12 m BGL) and/or groundwater.
	Define the temporal boundaries of the decision	Assessment relates to the site in its current condition with data to be obtained over a period of monitoring which is suitable for assessment purposes, i.e.: • Sufficient to cover pre and during construction period. • Such that it is unlikely that additional data will change the interpretation of the data, the outcome of the risk assessment and proposed management actions. The temporal boundary is restricted to the Site in its current condition and during construction, and qualitative consideration of potential for short term disturbance during development works.
	Define the scale of decision making	The scale of the decision making is limited to the Site boundaries (Figure 1 of the SMP) and identified adjacent offsite receptors.
	Identify any practical constraints on data collection	Constraints on data collection are set out in Step 1 of this table.
Step 5: Develop a Decision Rule	Specify the statistical parameter that characterises the population of interest	Management targets are provided in Section 3.3 of the SMP.
	Specify the action level for the decision	

<table>
<tr><th>DQO</th><th>Sub-item</th><th>Description</th></tr>
<tr><td></td><td>Confirm that the action level exceeds measurement detection limits</td><td><u>Ground gas:</u>
Detection limits for the GA5000 are listed below:
<table><tr><th>Landfill gas/vapour</th><th>Detection limit range</th></tr><tr><td>Methane</td><td>0-100%</td></tr><tr><td>Carbon dioxide</td><td>0-100%</td></tr><tr><td>Oxygen</td><td>0-25%</td></tr><tr><td>Carbon monoxide</td><td>0-2,000 ppm</td></tr><tr><td>Hydrogen sulphide</td><td>0-5,000 ppm or 0-10,000 ppm</td></tr><tr><td>Methane/ carbon dioxide accuracy</td><td>+/- 0.5% after calibration</td></tr><tr><td>Flow accuracy</td><td>+/-0.3 L/hr</td></tr></table>
Detection limits for the PID are listed below:
• 0-2000 ppm: +/- 2 ppm or 10% reading
• >2000 ppm: +/- 20% of reading

<u>Soil and groundwater:</u>
Nominated laboratory limits of reporting (LOR) values will be below the nominated management targets (Section 3.3 of the SMP).</td></tr>
<tr><td></td><td>Combine the outputs from the previous DQO steps and develop a decision rule.</td><td>If the decision rule parameter presented in the first part of this Step 5, exceeds the action level in this Step 5, then the following actions may be undertaken:
• Undertake additional assessment (including monitoring and/or quantitative risk assessment); and/or
• Implement management measures.</td></tr>
<tr><td>Step 6: Specify Limits on Decision Errors</td><td>Baseline decision</td><td>Landfill gases and/or vapour characteristics and/or soil characteristics and/or groundwater quality (chemical concentrations) do not indicate a potentially unacceptable risk to relevant receptors as a result of the Ranford Road Metronet Station development.</td></tr>
<tr><td></td><td>Determine the possible range of the parameter of interest</td><td><u>Ground gas:</u>
The range of the parameters of interest range from the instrument limits of detection to the maximum concentrations of parameters of interest.
<u>Soil and groundwater:</u>
The range of the parameters of interest range from the field/laboratory LOR value to the maximum level of the analytes.</td></tr>
</table>

DQO	Sub-item	Description
	Define both types of decision errors, consequences and the baseline condition	There are two main types of decision errors likely to result from implementation of the SMP. These are discussed below. • Type I: Concluding that the site being assessed is contaminated when it is not. This may result in unnecessary expenditures for further investigation and/or remediation. • Type II: Concluding that the site being assessed is not contaminated when it is. This may result in risks to human health and the environment. There are two main components of error that may lead to decision errors (US EPA 2006): • Sampling error: This is influenced by the inherent variability of the population over space and time, the sample collection design, and the number of samples taken. It is usually impractical to measure the entire population space, and limited sampling may miss some features of the natural variation of the measurement of interest. Sampling design error occurs when the data collection design does not capture the complete variability within the population space, to the extent appropriate for making conclusions. Sampling error can lead to random error (i.e., random variability or imprecision) and systematic error (bias) in estimates of population parameters. • Measurement error: This is influenced by imperfections in the measurement and analysis system. Random and systematic measurement errors are introduced in the measurement process during physical sample collection, sample handling, sample preparation, sample analysis, data reduction, transmission, and storage. In general, sampling error is much larger than measurement error and consequently needs a larger proportion of resources to control (US EPA 2006).
	Acceptable limits on decision errors	The magnitude of error from the above and likelihood of making incorrect conclusions is controlled (to within acceptable limits) by selection of an appropriate sampling design and accurate measurement techniques. Acceptable limits on decision errors selected for this assessment are further described in the Data Quality Indicators (DQI) in Section 2 of this document.
Step 7: Optimise the Design		To maintain the integrity and reliability of data, the following measures will be adopted: • Use of relevant guidelines. • Review of the field and analytical results obtained during each stage of monitoring/ sampling (pre-development, during development, post-development). • Use of robust field and laboratory quality assurance/quality control protocols as outlined in Section 2 of this document. • Use of NATA accredited laboratories and suitable laboratory limits of reporting.

1.2 Basis for adoption of assessment criteria

1.2.1 Soil assessment criteria

Refer to Management targets (Section 3.3.) and relevant criteria in Section 6 of the SMP.

1.2.2 Groundwater assessment criteria

Refer to Management targets (Section 3.3.) and relevant criteria in Section 6 of the SMP.

1.2.3 Ground gas assessment criteria

Refer to Management targets (Section 3.3.) and relevant criteria in Section 6 of the SMP.

1.3 Ground gas monitoring methodology

Ground gas monitoring shall be conducted in accordance with the methodologies outlined in the following sections.

1.3.1 Ground gas monitoring locations

Monitoring locations are shown in **Attachment 1**.

In addition to the existing monitoring wells, installation of new monitoring wells is expected to be required to:

- Reinforce the existing monitoring well network in response to further refinement of development proposals that will take place and requirements for further information as a result of this.
- Replace any existing monitoring wells which are required to be removed at any point during development construction works.

Requirements for new monitoring wells (anticipated at this time) are summarised in Section 6 of the SMP.

The number and location of monitoring wells and monitoring requirements is however subject to outcomes from the design process. Requirements for new monitoring wells and associated monitoring shall be reassessed by the Environmental Consultant when relevant further information becomes available during the progression of design for the development.

Where necessary, the number, location and other relevant details shall be amended in order to provide a robust network of monitoring wells for use during construction and operation of the new station in order to manage risks posed by the former landfill to relevant receptors.

Further guidance to inform decision-making concerning the appropriate density/location of future monitoring wells is provided in NSW EPA (2019), UKEA (2004) and EPA Victoria (2015).

1.3.2 Calibration of equipment

Prior to use in the field, all field instruments will be calibrated by the equipment supplier to optimise the accuracy of the measurements taken. If field measurements appear to be inconsistent or incorrect, the equipment supplier shall re-calibrate or provide another instrument.

GA5000 (gas analyser)

The gas analyser calibration procedure will be conducted as follows:

- Calibrated with ambient air conditions at the Site (commencement of each day or where anomalous concentrations are observed).
- Calibrated with 2 different gas mixes, one containing carbon dioxide (60%) and methane (40%) and the other containing hydrogen sulphide (25 ppm), carbon monoxide (25 ppm) and oxygen (18%) (commencement of each day).

Photoionization detector (PID)

The PID calibration procedure, conducted via a two-point calibration, is as follows:

- Calibrated with 'scan' calibration gas (100 ppm isobutylene) in the field twice daily (commencement of each day and again at midday).
- Calibrated to ambient air conditions at the Site (commencement of each day or where anomalous concentrations are observed).
- 'Bump tested' after any high reading (above 50 ppm). This involves connecting the PID to the scan gas (100 ppm isobutylene) to check its accuracy (percentage of gas recovery i.e. 90 ppm indicates -10% recovery).
- Replacing water trap filter after moisture is reported in the monitoring wells.

1.3.3 Equipment detection limits

Equipment detection limits are outlined in Table 2.

Table 2 Detection limits of gas monitoring equipment

Gas and Vapour Equipment	Parameter	Detection limits
Geotech GA5000 Gas Analyser	Methane	0 – 70% specification, 0 – 100% reading
	Carbon dioxide	0 – 60% specification, 0 – 100% reading
	Oxygen	0 – 25%
	Carbon Monoxide	0 – 500 ppm
	Hydrogen Sulphide	0 – 500 ppm internal
	Flow Pod (internal)	-0.1 – 12 L/Hr
MiniRAE 3000 Photo Ionisation Detector	Isobutylene (calibration gas)	0 – 10,000 ppm
Inspectra Laser	Methane	0 ppm to 100% Vol. gas

1.3.4 Leak testing

Basic field leak testing will be undertaken at each monitoring well to confirm the integrity of the monitoring wells and sampling train. This will be undertaken by calibrating the PID to ambient air (0.0 ppm) then connecting the PID to the monitoring well and whilst pumping the well, wiping the exterior of the well head, including around the gas tap seal and connection to the PID, with an isobutylene alcohol wipe. If a leak is present, the PID should detect the alcohol from the wipe and report a reading. Results of this test should be recorded on a field sheet and kept on file.

1.3.5 Ground gas monitoring methodology

Gas monitoring from gas monitoring wells shall be undertaken with reference to the procedures outlined in NSW EPA (2012) and CIRIA C665 (CIRIA, 2007). Monitoring in the field will be undertaken using a Geotech GA5000 portable infra-red gas analyser with internal flow pod and PID for the following:

- methane
- carbon dioxide
- oxygen
- carbon monoxide
- hydrogen sulphide
- atmospheric pressure
- gas flow
- volatile organic compounds (VOCs)

During the monitoring rounds, the following general procedure will be followed:

- The integrity of the well will be recorded prior to sampling.
- An ambient reading will be undertaken prior to sampling each well (to ensure accuracy of results and no cross contamination occurred).
- Well will be unlocked and brass connector attached.
- The GA5000 will be used to measure atmospheric pressure, relative pressure and flow, followed by landfill gases over a minimum period of ten minutes, as per NSW EPA (2012).
- The PID will then be used to measure the volatile organic compounds in vapour over a minimum period of three minutes.
- For both the GA5000 and PID, all concentrations will be recorded until stabilisation, and a summary of steady state, peak and/or low concentrations will be recorded as per NSW EPA (2012) and CIRIA (2007) requirements.
- Any field observations will be noted e.g. moisture in sampling tubes.

1.3.6 Ground gas sub-surface service pit monitoring (if required)

Monitoring of ground gas (methane and hydrogen sulfide) in sub-surface service pits (if required) will be conducted using a calibrated Huberg Laser One gas analyser, as per EPA Victoria (1684). The probe of the instrument will be inserted into available apertures in the pit lids where present, otherwise

the instrument will be held in close proximity to the pit (circa ten to twenty millimetres) and held in this position until the concentration reading has peaked (a minimum of five to six seconds to allow the instrument to respond).

1.4 Groundwater sampling methodology

Groundwater sampling shall be conducted in accordance with the methodologies outlined in the following sections.

1.4.1 Groundwater sampling locations

The proposed groundwater sampling locations are shown in **Attachment 2**.

1.4.2 Inspection of existing wells

Prior to undertaking groundwater monitoring, the existing wells that are intended for sampling shall be positively identified in the field. Any ambiguity shall be resolved prior to proceeding. Where bore headworks are suitable, the depth to groundwater in the well shall be measured using an interface probe. If the interface probe detects a blockage, a steel bailer shall be used to attempt to clear the blockage. In the event that the blockage cannot be cleared, sampling of the well shall be abandoned and an alternative suitable well selected.

1.4.3 Groundwater sampling methodology

Groundwater sampling procedures will be undertaken as follows:

- Monitoring wells will be gauged to determine the standing water levels by the use of an interface probe. Depth measurements will be referenced to the top of well casing as an established datum. Where possible, depth measurements will be recorded to the nearest 1 cm.
- Field notes regarding odour or other observations will be recorded. Total well depth and the height difference between the well head and the ground level will be recorded.
- Teflon-free Hydrasleeves (single use) will be placed at the bottom of the screening depth for each groundwater monitoring well to be sampled.
- Wells will be allowed to stabilise for a minimum of one day following installation of Hydrasleeves prior to the recovery of the devices and sampling.
- Upon completion of groundwater sampling using the Hydrasleeves, field physicochemical parameters (temperature, pH, EC, DO and ORP) will be measured using a down-well water quality meter.
- All equipment shall be teflon-free and comply with PFAS sampling protocols provided in DWER guidance (DER, 2017).

1.5 Soil sampling methodology

Soil sampling (where required) will be undertaken with reference to *Assessment and Management of Contaminated Sites* (DER 2014), *AS 4482.1 – 2005* (Standards Australia 2005) and *AS 4482.2* – 1999 (Standards Australia 1999) and *ASC NEPM*.

At each soil sampling location, the following will apply:

- Sample locations will be recorded on a GPS device and appropriately marked on a site plan.
- Logging of soils will be consistent with the Unified Soil Classification System (USCS) at each sample location, comprising the material description (colour, particle size, roundness and sorting) and a note of the water level/saturation content.
- A photographic log will be taken at each sample location.
- Field screening for VOCs using a PID for each soil sample.
- Sample collection directly into NATA-accredited laboratory soil containers and placed immediately into pre-chilled eskies. Disposable nitrile gloves will be used at each sample locations to minimise cross-contamination and ensure safety.

Additionally, chain of custody documentation will be completed to accompany all sample containers to the laboratory.

2. Quality assurance/quality control requirements

The quality assurance/quality control (QA/QC) procedures are based on *ASC NEPM* and DWER *Assessment and management of contaminated sites* (DER, 2014). The QA/QC program shall be implemented during all monitoring components of the SMP.

QA involves all of the actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples and accuracy and reliability of analytical results (NEPC, 2013). QC involves protocols to monitor and measure the effectiveness of QA procedures.

2.1 Field program

Key requirements of the QA/ QC procedures include:

- Detailed records - records documenting field activities using standardised templates.
- Sample identification and equipment decontamination procedures.
- Sample preservation and analytical holding times - all samples are to be transported/ received by the analytical laboratory in accordance with relevant holding time requirements.
- QC sampling frequency to be collected at required frequencies.
- Use of teflon-free equipment to ensure appropriate collection of PFAS samples (in accordance with Appendix 1 of DWER, 2017).

The ASC NEPM outlines the QC sampling protocol which will be adopted for environmental assessments. The QC samples to be collected during the investigation of soil and groundwater are described below:

- Blind (inter-laboratory) duplicates: Blind duplicate samples are used to identify the variation in the analyte concentration between samples from the same sampling point and the repeatability of the laboratory's analysis. Duplicates will be collected at a frequency of one per 20 primary samples for each CoPC.
- Split (intra-laboratory) duplicates: Split duplicate samples provide an indication of the repeatability of the results between laboratories. Duplicates will be collected at a frequency of one per 20 primary samples for each CoPC.
- Rinsate blanks: Rinsate blank samples are water samples collected from decontaminated, re-used field equipment and used primarily to assess whether the decontamination procedure is effective and if cross contamination has led to positive observations in subsequent samples. A rinsate blank will be prepared from the low-flow pump for each day of groundwater sampling for each CoPC analysed in the batch from the day of sampling.
- Field blanks: Field blank samples are used to estimate contamination of a sample during the collection procedure. A field blank will be prepared for each day that soil and groundwater samples are collected for each CoPC analysed in the batch from the day of sampling.
- Transport blanks: Transport blank samples are used to estimate the amount of contamination introduced during the transport and storage of samples from the time of sampling to the time of analysis. A transport blank will be prepared for all volatile and semi-volatile CoPCs analysed in each batch of groundwater samples collected/ submitted to the laboratory.

With respect to ground gas monitoring (in-field landfill gas measurements), collection of QC samples is not proposed.

2.1.1 Field quality assurance procedures

- Decontamination procedures - Including the use of new disposable gloves for the collection of each sample, decontamination of the sampling equipment between each sampling location and the use of non-Teflon dedicated sampling containers provided by the primary laboratory (appropriate for PFAS analysis).
- Sample identification procedures - Collected samples are immediately transferred to sample containers of appropriate composition and preservation for the required laboratory analysis. All sample containers are clearly labelled with a sample number, job number, sample depth and sample date. The sample containers are then transferred to a chilled insulated container (using ice contained in plastic) for sample preservation prior to and during shipment to the analytical laboratory.
- CoC information requirements - A CoC form is completed and forwarded to the testing laboratory with the samples. A CoC form will be used for every batch of samples submitted to the laboratory. Delivery and analysis of samples to the laboratory will need to comply with sample holding times (6 months for PFAS analysis).
- Sample blind/split duplicate and rinsate frequency as per Section 2.1.2.
- Calibration of field equipment: Field equipment (i.e. water quality meter) will be calibrated by the rental supplier to ensure accuracy of measurements taken in the field. If field measurements appear inconsistent, the Consultant will either complete field calibration of the equipment or replace equipment with newly calibrated equipment from the supplier
- At the commencement of the landfill gas/vapour monitoring event, a leak test will be undertaken at all wells scheduled to be sampled. The leak test will be undertaken using a PID and an isopropyl alcohol impregnated wipe. An initial reading (without the wipe) will be taken, then a reading with a wipe around the sampling train and top of well casing, and lastly a final reading without a wipe again. This will be recorded on field notes and included in the updated DSI.

2.1.2 Sampling and analysis quality control

The NEPC (2013) and DER (2014) guidelines outline a recommended approach to QC sampling. The QC samples to be collected during the investigation are described as follows:

- Blind (inter-laboratory) duplicates: Blind duplicate samples are used to identify the variation in the analyte concentration between samples from the same sampling point and the repeatability of the laboratory's analysis. Duplicates will be collected at a frequency of one per 20 primary samples for each CoPC, with the exception of samples allocated for PFAS analysis (one duplicate per 10 primary samples).
- Split (intra-laboratory) duplicates: Split duplicate samples provide an indication of the repeatability of the results between laboratories. Duplicates will be collected at a frequency of one per 20 primary samples for each CoPC, with the exception of samples allocated for PFAS analysis (one duplicate per 10 primary samples).
- Rinsate blanks: Rinsate blank samples are water samples collected from decontaminated, re-used field equipment and used primarily to assess whether the decontamination procedure is

effective and if cross contamination has led to positive observations in subsequent samples. A rinsate blank will be prepared from the low-flow pump for each day of groundwater sampling for each CoPC analysed in the batch from the day of sampling.

- Field blanks: Field blank samples are used to estimate contamination of a sample during the collection procedure. A field blank will be prepared for each day that soil and groundwater samples are collected for each CoPC analysed in the batch from the day of sampling.
- Transport blanks: Transport blank samples are used to estimate the amount of contamination introduced during the transport and storage of samples from the time of sampling to the time of analysis. A transport blank will be prepared for all volatile and semi-volatile CoPCs analysed in each batch of groundwater samples collected/ submitted to the laboratory.

As no samples are proposed to be collected for the investigation of ground gas, the QA/ QC program for ground gas monitoring will include the following:

- Use of appropriately qualified and trained staff to install and monitor each location.
- Leak detection testing.

Monitoring during optimal meteorological conditions of no precipitation, relative cool temperatures and falling atmospheric pressure.

2.1.3 Relative percentage difference calculations

Blind and split duplicate samples will be assessed by calculating the relative percentage difference (RPD) between the primary, blind and split samples in accordance with the procedure described in AS 4482.1 – 2005 (Standards Australia 2005). Calculation of RPDs provides a quantitative measure of the accuracy of the analytical results reported.

RPD results will be considered acceptable if they are less than or equal to 30%. The exception to this is when concentrations within the primary and blind or split sample are less than ten times the laboratory LOR. In this case, a greater RPD value is considered acceptable.

2.2 Laboratory program

2.2.1 Laboratory analytical program

Laboratory methods to be used by the primary and secondary laboratories will be suitable for environmental contaminant analysis and are based on established internationally recognised procedures. Each of the laboratories is NATA accredited for the proposed analysis.

2.2.2 Laboratory quality control procedures

The following laboratory QC procedures will be used during the investigation.

Laboratory duplicate samples

Laboratory duplicate sample analysis is the analysis of a laboratory derived duplicate sample from the process batch, at a rate equivalent to one in 20 samples per analytical batch, or one sample per batch if less than 20 samples are analysed in a batch. A laboratory duplicate provides data on the analytical precision and reproducibility of the analytical results.

The permitted ranges for the RPD of laboratory duplicates are dependent on the magnitude of the results in comparison to the level of reporting as shown in Table 3.

Table 3 Acceptable laboratory duplicate relative percentage difference (RPD) ranges

Magnitude of result	Acceptable RPD range
< 10 x limit of reporting (LOR)	No limits
10 - 20 x LOR	0% - 50%
> 20 x LOR	0% - 20%

Method blank samples

Method or analysis blank sample analysis are the analysis of a sample that is as free as possible of the analytes of interest, but has been prepared the same as the samples under investigation. The analysis is to ascertain if laboratory reagents, glassware and other laboratory consumables contribute to the observed concentration of analytes in the process batch. If below the maximum acceptable method blank (20% of the practical quantitation limit), the contribution is subtracted from the gross analytical signal for each analysis before calculating the sample analyte concentration. The method blank should return analyte concentrations as 'not detected'.

Laboratory control samples

Laboratory control spike analysis is the analysis of either a reference material or a control matrix fortified with analytes representative of the analyte class. The purpose of laboratory control spike samples is to monitor method precision and accuracy independent of the sample matrix. Typically, the percentage recovery of the laboratory control spike sample is compared to the dynamic recovery limits based on the statistical analysis of the processed laboratory control spike sample analysis. Recoveries should lie between 70% and 130%.

Surrogate spike samples

Surrogate spike samples are samples with known additions of known amounts of compounds, which are similar to the analytes of interests in terms of extractability, recovery through clean-up procedures and response to chromatographic or other measurement. Surrogate compounds may be alkylated or halogenated analogues or structural isomers of analytes of interest. The purpose of surrogate spikes, which are added immediately before the sample extraction step, is to provide a check for every analysis that no gross processing errors have occurred, which could have led to significant analyte loss or faulty calculation. Recoveries should lie between 50% and 150%.

Internal standards

Internal standards are known additions of known amounts of compounds which are not found in real samples, will not interfere with quantification of analytes of interest and may be separately and independently quantified. The purpose of internal standards in instrumental techniques is to provide independent signals, which serve to check the consistency of the analytical step. Internal standards are often used for organic compounds and some inorganic compounds.

2.3 Evaluation of QA/QC program

Data quality indicators (DQIs) of completeness, comparability, representativeness, precision and accuracy will be adopted as an assessment of the reliability of field procedures and analytical results.

Field procedures and laboratory procedures are included in DQIs to provide an overview of the process in which data is collected at the Site. A summary of the adopted DQIs for this assessment is provided in Table 4.

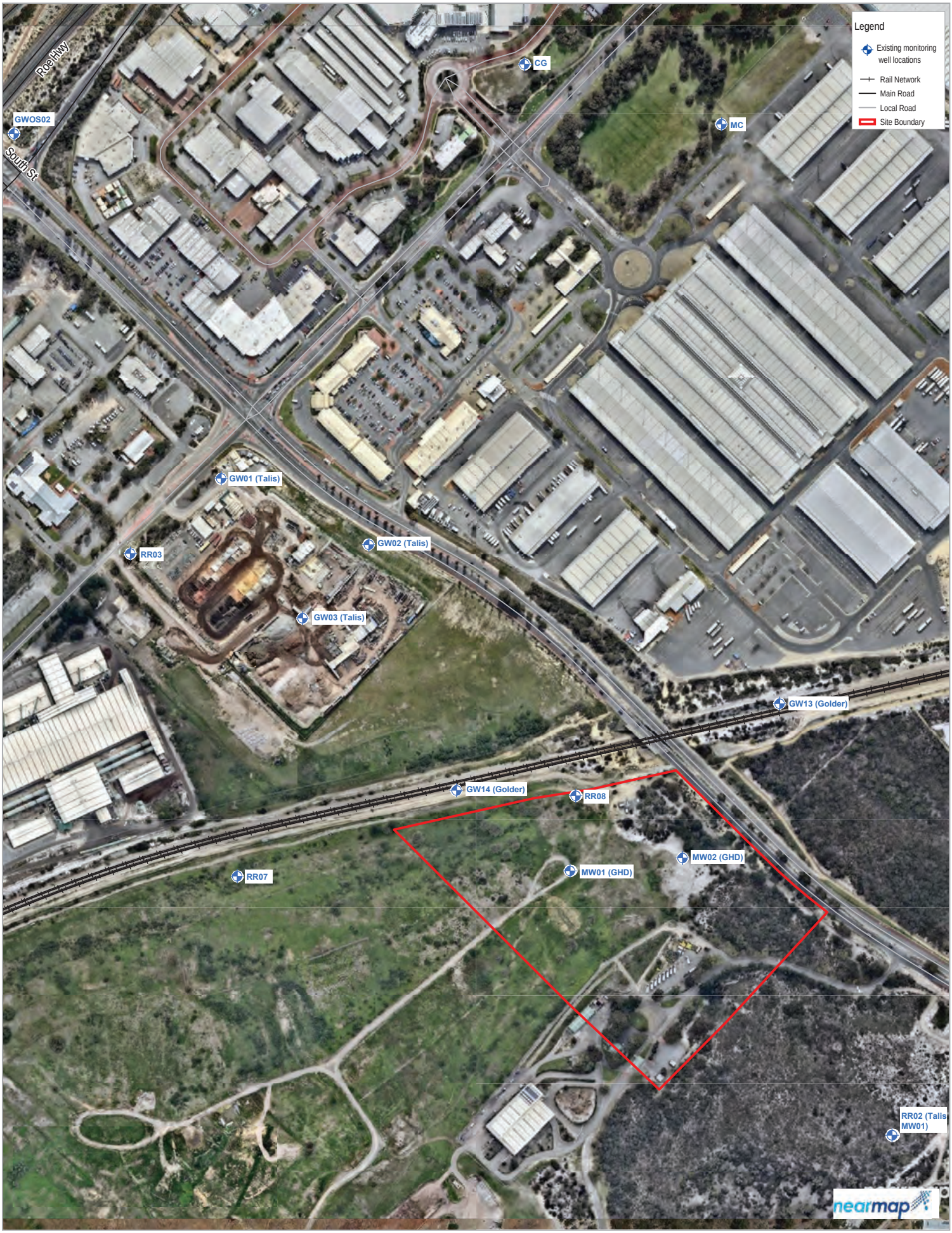
Table 4 Data quality indicators

DQI	Evaluation criteria
Completeness	All proposed locations are sampled. Samples analysed according to the SAQP.
	All field documentation is complete and correct, including chain of custody documentation for samples.
	Field forms and documentation capture all relevant important information.
	Samples analysed within appropriate holding times.
	Appropriate limits of reporting for comparison to relevant assessment criteria.
Comparability	Standardised operating procedure for sampling adhered to and is in line with relevant guidelines.
	Field staff are experienced and appropriately trained.
	Consistent equipment use with consistent methods adopted.
	Climatic conditions consistent and considered representative of region.
Representativeness	Samples collected in a uniform and consistent manner and representative of the media in the field.
	Monitoring wells target appropriate strata and constructed in accordance with relevant requirements.
	Field equipment calibrated by equipment supplier.
Accuracy	Sufficient quantities of field blanks, rinsate blanks and transport blanks collected and analysed, with no results indicating cross-contamination.
	Sufficient quantities of internal laboratory method blanks, surrogate spikes and laboratory control samples analysed to determine laboratory accuracy, with the large majority of samples within defined limits.

Attachment 1 – Existing ground gas sampling locations (to be expanded/refined as required by NEWest Alliance in response to design)


Legend
Landfill Gas/Vapour Monitoring Well
Railway
Site Boundary
Cadastre
New Services Easement
Rail Reserve
Landfill Waste Footprint
LFG01
LFG02
LFG03
LFG04
LFG05
LFG06
LFG07
LFG08
LFG09
LFG10
LFG11
LFG12
LFG13
LFG14
LFG15
LFG16
RANFORD ROAD
Paper Size ISO A3
0 20 40 60 80
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50
N
GHD
Public Transport Authority
Ranford Road Metronet
Landfill Gas/Vapour Monitoring Well Locations
Project No. 61-36438
Revision No. 0
Date 30/06/2018
FIGURE 1
G:\61\36438\GIS\Maps\Working\DSR\136438_004_LGSVLocations_Rev0_A3L.mxd
Print date: 05 Jul 2018 - 15:59
Data source: GHD: Site Boundary - 20171011, Sampling Locations - 20171213, Landfill waste footprint - 20180630 ; Landgate: Cadastre, Easements, Roads, Railway - 20171124, Aerial Imagery - 20180630.
Created by: afeeney, jwtait
SLIP
POWERED BY LANDGATE

Attachment 2 – Existing groundwater monitoring well network (to be expanded/refined as required by NEWest Alliance in response to design)



Paper Size ISO A3

0 25 50 75 100

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Public Transport Authority

Ranford Road Station Development - Site Management Plan

Groundwater monitoring well locations

Project No.	12517937
Revision No.	0
Date	06/08/2020

GHD
Level 10
999 Hay Street
T: 61 8 6222 8222 F: 61 8 9463 6012 E: permail@ghd.com

12517937-11707-105/https://projectsportal.ghd.com/sites/pp18_04/ranfordroadmetronets/ProjectDocs/12517937-REP-5-Ranford Road Station Development_SMP_1.docx
Document Status

Rev	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	N Rogers C Gorman S French (landfill gas)	S French M Welsh (landfill gas)	On file	S French	On file	28/04/2020
1	N Rogers C Gorman	S French	On file	S French	On file	03/06/2020
2	N Rogers C Gorman	S French	On file	S French	On file	23/06/2020
3	N Rogers C Gorman	S French	On file	S French	On file	02/07/2020
4	N Rogers C Gorman	S French	On file	S French	On file	07/08/2020
5	N Rogers C Gorman	S French		S French		02/09/2020

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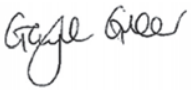
APPENDIX I STATION ACOUSTIC ASSESSMENT

NEWest Alliance

NEWest Ranford Road Station Development Application Report - Acoustics

METRONET: Yanchep Railway Extension and Thornlie-Cockburn Link

Document Approval

Rev	Date	Prepared by	Reviewed By	Approved by
A	26-Aug-2020	Rachel Foster / Laura Keen	Gayle Greer	Chris Deshon
Signature:				
Signature:				
Signature:				

Document Details

PTA Project:	180093 – METRONET Stage 1 Initiatives: Yanchep Railway Extension and Thornlie-Cockburn Link
PTA Document number:	
NEWest Document number:	TCY-DJV-TSC-EN-RPT-0001
Revision date:	26-Aug-2020
Revision:	A

DETAILS OF REVISION AMENDMENTS AND PLAN TERMINOLOGY

Document Control

The Acoustic Engineer is responsible for updating this plan to reflect changes as required.

Amendments

Any revisions or amendments must be approved by the Design Manager before being distributed or implemented.

Revision Details

Revision	Details
A	Issued for Development Application

Terms and Definitions

Term	Meaning
'A' Weighted	Frequency filter applied to measured noise levels to represent how humans hear sounds.
Ambient Sound	The all-encompassing sound at a point being a composite of sounds from near and far.
Background sound	The ambient sound in the absence of the sound under investigation.
dB	The decibel (dB) is a logarithmic unit of measurement that is commonly used to express sound pressure level. An increase of 3 dB corresponds to an approximate doubling of sound power. When applied to sound, an increase of 10 dB corresponds approximately to a perceived doubling of loudness; typically 0 dB is the threshold of hearing and 120 dB is the threshold of pain.
dB(A)	'A' Weighted overall sound pressure level.
D_W	Weighted Level Difference – Single number that represents the noise reduction in sound between two adjoining enclosed spaces. It is a field measurement that relates to the R_w laboratory measurement, but also includes all building elements and flanking paths and acoustic absorption in the receiving room. The result includes the actual noise reduction for the installed partition and ceiling systems. The higher the D_w, the greater the noise isolation between enclosed spaces. D_w has superseded NIC as the Australian Standard for acoustically rating room to room noise isolation. See NIC Below.

$D_{nC,w}$/ CAC	Weighted Ceiling Noise Reduction Index/Ceiling Attenuation Class. This is the ability of a ceiling to prevent the transmission of sound. The $D_{nC,w}$/CAC is a measure of sound reduction between rooms with a common ceiling plenum (or space).
$D_{nT,w}$	Weighted Standardised Field Level Difference: The D_w rating normalised to a standard room volume and room absorption (or reverberation time). The higher the $D_{nT,w}$ rating, the better the insulation performance.
Flanking transmission	The transmission, between two rooms sharing a common partition, of sound generated in the air of one of them via all paths except that through the common partition.
Free field	A sound field in a medium of such extent that the effects of the boundaries are negligible throughout the region of interest.
Frequency (Hz)	The human ear responds to sound in the frequency range of 20 Hertz (Hz) to 20,000 Hz. A combination of sound pressure and frequency determine perceived loudness. The centre frequency of an octave is double the frequency of the lower octave. Sound measurements are usually taken at 16 one-third octave bands between 50 and 5000 Hz.
Impact sound transmission level	In a given frequency band, between two rooms situated above the other: the average octave band sound pressure level, throughout the lower room, produced by impacts delivered by a standard tapping machine to the floor of the upper room.
Intermittent noise	A noise whose sound pressure level suddenly drops to the background level several times during the period of observation, the time during which the level remains at a constant value different from that of the background level being of the order of 1 s or more.
$L'_{nT,w}$	The single number quantity used to characterise the impact sound insulation of floors over a range of frequencies. See BS EN ISO 140-7:1998
L_{10}	Noise level exceeded for 10% of the measurement period. This represents the upper intrusive noise level and is often used to represent traffic/ music noise.
L_{90}	Noise level exceeded for 90% of the measurement period. This represents the background noise level excluding nearby sources. The L_{90} level is commonly referred to as the background noise level.
L_{eq}	Energy averaged noise level over the measurement period. This measure is commonly used when comparing the criterion noise level under the Environmental Noise Regulations and for comparison with relevant standards for air conditioning noise.

Abbreviations and Acronyms

Abbreviation/Acronym	Definition
AS/NZS	Australian/New Zealand Standard
JELR	Jandakot East Link Road
KnR	Kiss and Ride
NCC	National Construction Code
PA	Public Address systems
PnR	Park and Ride
PTA	Public Transit Authority of Western Australia
SPP 5.4	State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning
SWTC	Scope of Work and Technical Criteria
TCL	Thornlie Cockburn Link
WAEPNR	Western Australia Environmental Protection (Noise) Regulations 1997
YRE	Yanchep Rail Extension

CONTENTS

Tables

Figures

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1. INTRODUCTION

The proposed new Ranford Road Station is to be located along the Thornlie Cockburn Link, approximately 14 km south-east of Perth, as indicated in Figure 1. The proposed station site is to be located adjacent to Ranford Road, south of Bannister Road and north of Clifton Road in Canning Vale.

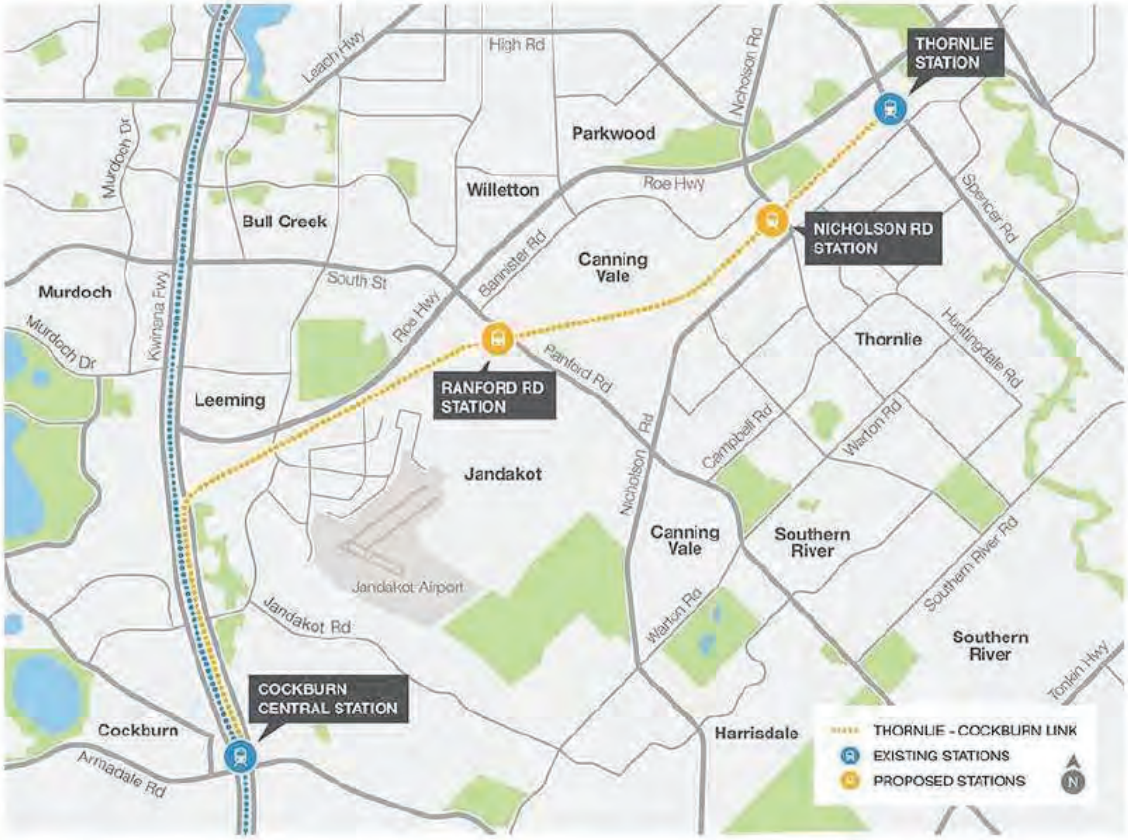


Figure 1: Proposed TCL Line

The proposed station is to be located on a largely unoccupied parcel of land adjacent to the current Ranford Road bridge over the freight rail line. The site boundary is shown in Figure 2. The site is currently clear, however areas of the site have previously been used as a land waste facility. The site will be adjacent to the Canning Landfill and Recycling Facility (Waste Transfer Station) which will continue to operate in the future, albeit with an amended access arrangement, as shown in Figure 3.

Figure 2: Proposed Ranford Road Station location

The station will be a single-platform train station with concourse and station building elements, being a multi-modal interchange providing facilities for pedestrian and cycle access, local bus service interchanges, kiss-and-ride and park-and-ride passengers. Over 400 parking bays are proposed for the station, which are to be located on the southern side of the station.

All the station car parking access to and from the site shall be via the new Jandakot East Link Road that will connect to Ranford Road via a new intersection, to be located east of the site. However, southbound Transperth bus access shall be via a new connection just south of the current Ranford Road rail bridge. Northbound buses are able to access the station directly from Ranford Road.

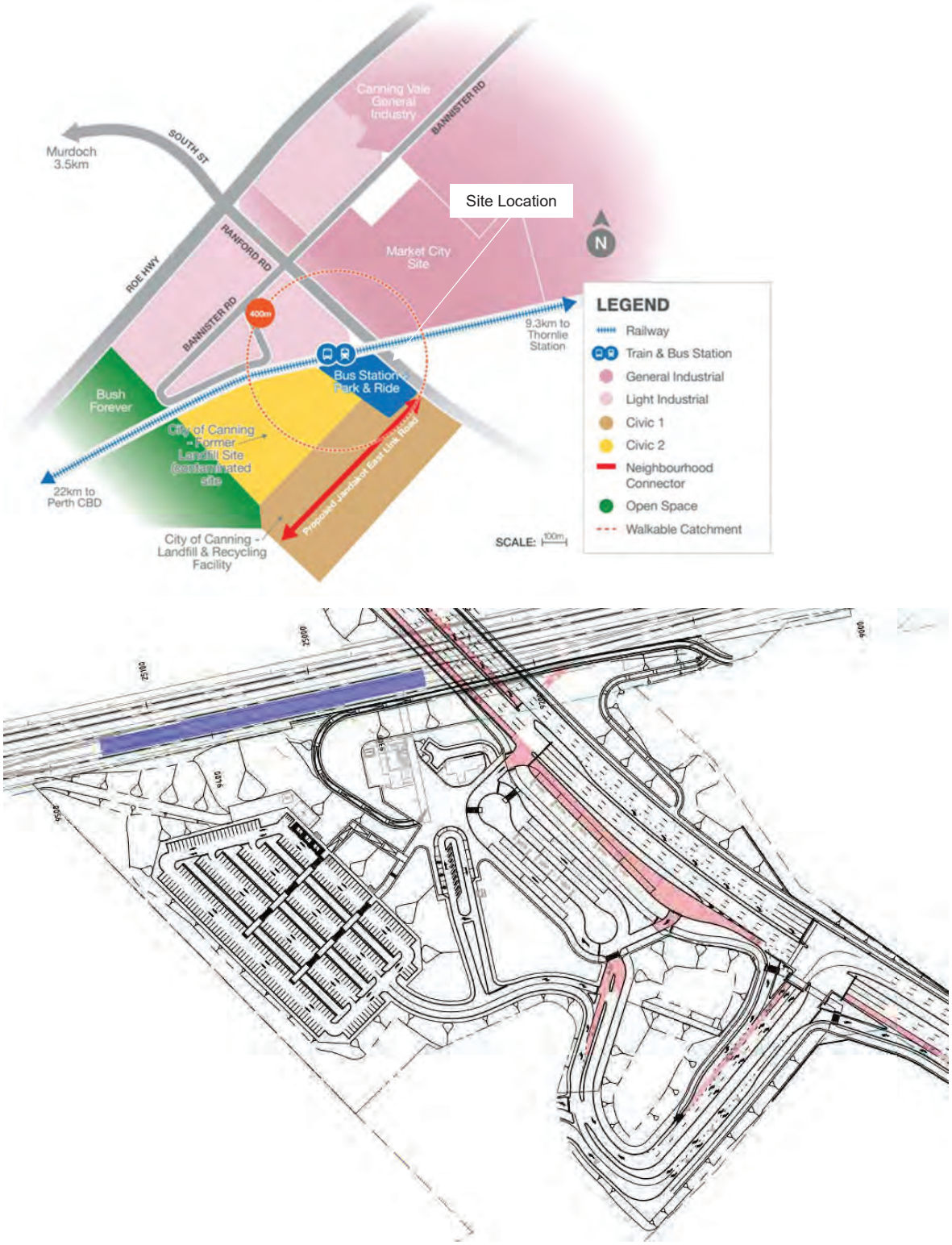


Figure 3: Proposed Ranford Road Station overall plan

2. ACOUSTIC ENGINEERING SCOPE

The MetroNet Design Joint Venture (DJV) is to include provision of acoustic services for the proposed Ranford Road Station development. The acoustic design addresses the station, which will be comprised of a passenger platform with a concourse above and incorporating a station access building, and the associated parking, connection into new and existing roads and bus interchange.

The key acoustic issues associated with the Ranford Road Station project are:

- The control of noise intrusion into the buildings and the impacts of noise on platform areas from road traffic and mechanical plant.
- The control of building services noise including mechanical plant.
- Reverberation control within spaces
- Acoustic separation of dissimilar spaces
- The control of noise emission from mechanical plant to neighbouring sites
- Assessment and control of the noise from proposed car parking areas to the north of the station
- Assessment and control of the noise from the proposed bus movements.

This report sets out acoustic design criteria and the design requirements to achieve the recommended acoustic conditions associated with Development Assessment (DA) application. These are predominantly criteria for environmental noise emission from the station to adjacent noise-sensitive premises.

3. DESIGN CRITERIA

3.1 DESIGN STANDARDS AND CODES

In addition to the Yanchep Rail Extension and Thornlie Cockburn Link Scope of Work and Technical Criteria (SWTC) and the Public Transit Authority of Western Australia (PTA) specific requirements, other codes and standards required to develop the acoustic design for DA include the following:

- State Planning Policy 5.4 *Road and Rail Transport Noise and Freight Considerations in Land Use Planning*
- AS 2436-2010 *Guide to noise and vibration control on construction, maintenance and demolition sites*
- Western Australia *Environmental Protection (Noise) Regulations 1997* (WAEPNR)
- PTA Technical & Operational standards, policies and procedures.

The above list is not exhaustive but is provided to note the key guides and standards to which the design shall align.

3.2 NOISE IMPACTS TO SURROUNDING SENSITIVE PREMISES

3.2.1 BUILDING SERVICES, PA SYSTEM AND CAR PARK

The Yanchep Rail Extension and Thornlie Cockburn Link Scope of Work and Technical Criteria states the following:

> *Stations and associated infrastructure (e.g. carparks, plant rooms etc) must be designed to comply with the requirements of the Environmental Protection (Noise) Regulations 1997 (WA)*

Noise criteria for both steady-state and discrete noise emission from the proposed Ranford Road Station project are nominated in this section. The setting of noise emission criteria is intended to protect the acoustical amenity of nearby sensitive receivers.

Environmental noise impacts resulting from the Ranford Road Station project are addressed through the Environmental Protection Act 1986 with the prescribed standards detailed in the Western Australian *Environmental Protection (Noise) Regulations 1997* (WAEPNR). The regulations are based on maximum allowable noise levels termed the 'assigned noise level'. The regulations require that:

> *Noise emitted from any premises when received at other premises must not cause, or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind*

A noise emission is taken to 'significantly contribute to' a level of noise if the noise emission exceeds a value which is 5 dB below the assigned level at the point of reception.

Table 1: Assigned levels by the Western Australian Environmental Protection (Noise) Regulation 1997

Type of premises receiving noise	Time of Day	Environmental Emission Criterion Level dB(A)		
		$L_{A,10}$	$L_{A,1}$	$L_{A,max}$
Nearest noise sensitive receiver: highly sensitive area	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial Premises	All hours	60	75	80
Industrial premises	All hours	65	80	90

The regulations also apply penalties on noise levels that contain annoying characteristics such as tonal components. Where these characteristics do exist and cannot be practicably removed, then the measured levels are adjusted according to the penalties as follows:

- Where tonality is present: +5 dB
- Where modulation is present: +5 dB
- Where impulsiveness is present: +10 dB.

The noise adjustments apply up to a maximum cumulative total of 15 dB.

The influencing factor is applied to account for higher noise areas as a result of nearby industrial and commercial areas and major roads. The influencing factor is determined by considering the land use within two circles having a radius of 100 m and 450 m from the noise sensitive premises of concern and proximity to major and minor roads as defined in the WAEPNR. The nearest noise sensitive receivers (NSR) in the vicinity of the Ranford Road Station project have been identified as shown in Figure 4 and are summarised in Table 2 below.

Figure 4: Nearest noise-sensitive receiver locations

Table 2: Nearest noise-sensitive receiver locations

Location	Noise Sensitive Receiver	Receptor Type
North	38 Merrifield Circle, Leeming	Residential
East	28 Marginata Parkway, Canning Vale	Residential
South	2 Livingstone Drive, Canning Vale	Residential

Note: Selection of noise sensitive premises is based on Schedule 1 – Part C of the WAEPNR

Transport factors of 6 dB(A) and 2 dB(A) are applied to noise sensitive receivers if major roads are located within 100 m and 450 m respectively. A transport factor of 2 dB(A) is applied to noise sensitive receivers if a secondary road is located within 100 m of a noise-sensitive receiver.

A major road is defined as having vehicle traffic flows in excess of 15,000 vehicles per day. A secondary road is defined as having traffic flows of 6,000 to 15,000 vehicles per day.

The major roads and secondary roads within 100 m and 450 m of the noise-sensitive receivers are taken from the Main Roads Western Australia website https://trafficmap.mainroads.wa.gov.au/map and are given in Table 3 below.

Table 3: Major / secondary roads adjacent to Ranford Road Station

Location	Major road within 100 m	Secondary road within 100 m	Major road within 450 m
North	Roe Highway, South Street	-	Roe Highway, South Street, Vahland Avenue, Ranford Road
East	-	-	Ranford Road
South	Ranford Road	-	Ranford Road

The area surrounding the Ranford Station is predominantly industrial, with parkland areas to the east and residential further to the east and south. The road and rail reserves associated with the existing rail corridor and Roe Highway/Ranford Road are considerable. The zoning plans for the City of Canning, City of Gosnells and City of Melville have been used to identify the zoning around the station. To determine the influencing factor, existing roads and land uses have been considered. The influencing factor at the nearest noise sensitive receivers is summarised below.

Table 4: Environmental Design Criteria – Influencing Factor

Location	% Industrial Area Use		% Commercial Area Use		Transport Factor	Influencing Factor
	100 m	450 m	100 m	450 m		
North	50%	29%	0%	14%	6 dB(A)	15 dB(A)
East	13%	58.5%	0%	0%	2 dB(A)	9 dB(A)
South	39.5%	26%$	0%	0%	6 dB(A)	13 dB(A)

The assigned levels are adjusted by the calculated influencing factors to result in the overall noise emission criteria for the area.

Table 5: Environmental Design Criteria – Ranford Road Station Assigned Noise Levels, dB(A)

Type of premises receiving noise	Time of Day	Environmental Emission Criterion Level dB(A)		
		$L_{A,10}$	$L_{A,1}$	$L_{A,max}$
North	0700 to 1900 hours Monday to Saturday	60	70	80
	0900 to 1900 hours Sunday and public holidays	55	65	80
	1900 to 2200 hours all days	55	65	70
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	50	60	70
East	0700 to 1900 hours Monday to Saturday	54	64	74
	0900 to 1900 hours Sunday and public holidays	49	59	74
	1900 to 2200 hours all days	49	59	64
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	44	54	64
South	0700 to 1900 hours Monday to Saturday	58	68	78
	0900 to 1900 hours Sunday and public holidays	53	63	78
	1900 to 2200 hours all days	53	63	68
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	48	58	68
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

Commercial Premises	All hours	60	75	80
Industrial premises	All hours	65	80	90

Notes: A noise emission from a premises is considered to not significantly contribute to the noise at a receiver if the noise emission is 5 dB below the overall noise emission criteria for the area.

It is noted that the WAEPNR does not specifically identify that the above environmental noise criteria are applicable to noise from rail passengers and patrons of the Ranford Road Station; however, an assessment is made here to quantify the likely impacts of these sources to adjacent noise-sensitive receivers.

3.2.2 STATION ENTRY ROADS AND BUS MOVEMENTS

The Yanchep Rail Extension and Thornlie Cockburn Link Scope of Work and Technical Criteria states the following:

> *The Alliance must design roads works and any associated noise mitigation controls to meet the requirements of Western Australia State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning.*

Table 6: Environmental Design Criteria – New and Upgraded Public Roads and Bus Lanes

Type of premises receiving noise	Time of Day	New Road	Upgraded Road
Noise-sensitive land use (existing and planned development)	Day (6 am–10 pm)	L_{Aeq} (Day) = 55 dB(A)	L_{Aeq} (Day) = 60 dB(A)
	Night (10 pm–6 am)	L_{Aeq} (Night) = 50 dB(A)	L_{Aeq} (Night) = 55 dB(A)

For the Ranford Station project, this includes internal station roads, new connections to Ranford Road, and the new Jandakot East Link Road.

It is noted that the assessment of rail noise to adjacent noise-sensitive receivers is being addressed separately for the MetroNet project, and does not form part of this scope.

3.3 CONSTRUCTION NOISE AND VIBRATION

The WAEPNR clarifies that the environmental noise criteria outlined in Table 5 are not applicable to noise emitted from a construction site where works are carried out between 0700 hours and 1900 hours on any day which is not a Sunday or public holiday if it shown that the construction works are generally carried out in accordance with the control of Section 4 of AS 2436-2010 *Guide to noise and vibration control on construction, maintenance and demolition sites* and if construction work is carried out in accordance with an approved management plan.

It is noted that a specific construction noise and vibration management plan is being addressed separately for the MetroNet project, which will include relevant site clearing and construction works associated with the Ranford Road Station, and does not form part of this scope.

4. ACOUSTIC DESIGN ELEMENTS

4.1 STATION IMPACTS TO SURROUNDING SENSITIVE PREMISES

4.1.1 BUILDING SERVICES

Mechanical services plant selections for the Ranford Road Station have not been determined at this stage, however, will likely comprise:

- Small ducted exhaust fans to ablution facilities and electrical plant spaces
- Small outdoor air fans
- Air conditioning to comms room and electrical room incorporating split systems with wall-mounted indoor units
- Two transformers as follows:
  - 1x 630 kVA precinct mains supply transformer – 66 dB(A) Sound Power Level
  - 1x 500 kVA station isolation transformer – 62 dB(A) Sound Power Level.

The anticipated equipment and locations are as shown in Figure 5.

It is expected that standard noise control measures will be sufficient to control mechanical services plant noise in order to meet the required environmental noise levels at adjacent noise-sensitive areas. Such measures include:

- Selection of quietest possible equipment
- Internal duct lining (where appropriate)
- Appropriate location of equipment away from adjoining noise-sensitive receivers (including taking advantage of shielding afforded by the station itself)
- Acoustic louvres to plant spaces as necessary
- Enclosure of transformers.

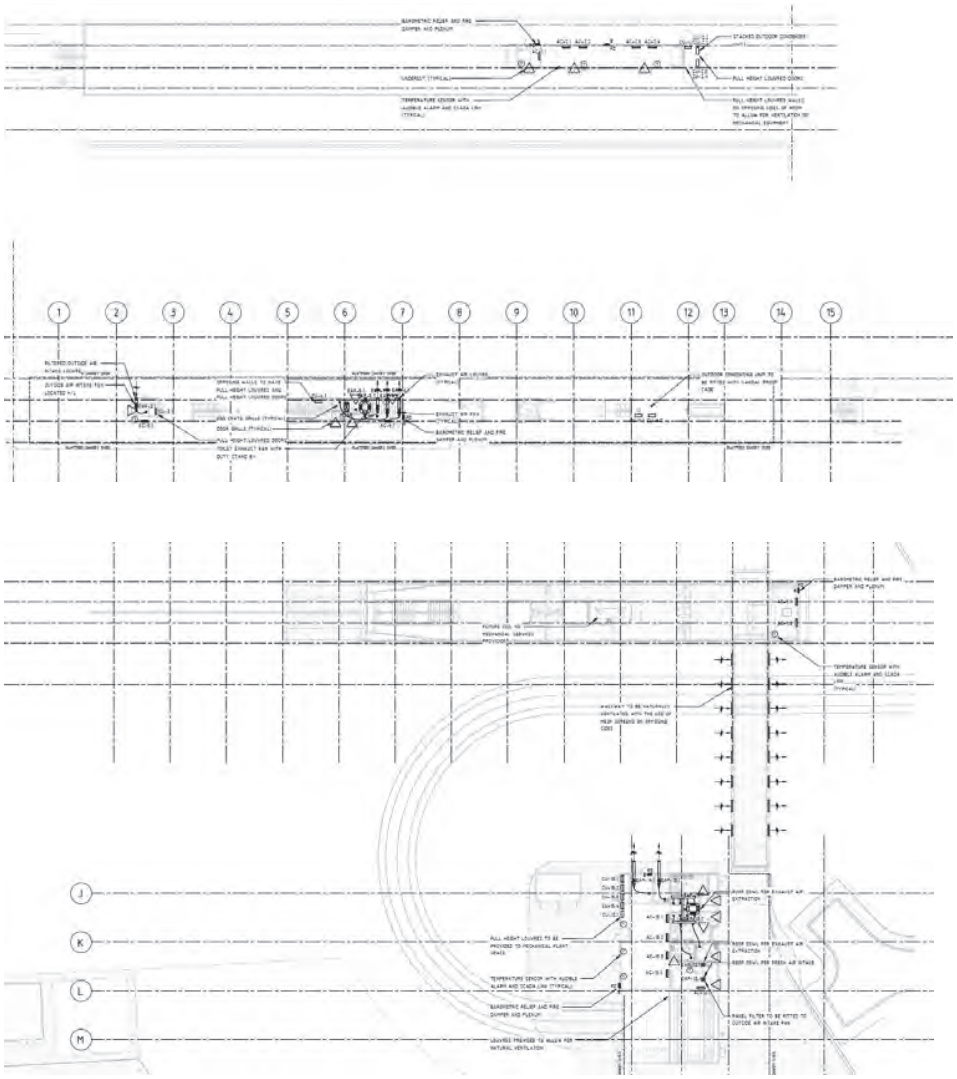


Figure 5: Proposed Ranford Road Station building services

4.1.2 PUBLIC ADDRESS SYSTEM

The design of the public address system design will be developed during the next stage of the design development to meet the environmental noise criteria outlined in Table 5.

Preliminary calculations suggest that a maximum combined sound power level of all PA speakers of approximately 103 dB(A) would achieve the environmental noise criteria at all noise-sensitive receivers.

4.1.3 CAR PARK

The car parking associated with the Ranford Station is proposed to have a maximum capacity of over 400 bays. Assuming the car park is full during peak hours (morning and afternoon), the car park receives 194 trips, and the resulting predicted noise levels from the car park alone at the nearest noise-sensitive receptors are as follows:

- North 12 dB(A)
- East 23 dB(A)
- South 19 dB(A)

It is noted that these estimated car park noise levels do not take into account any acoustic barriers which the project may be required to construct to meet rail noise criteria as defined in the SWTC.

Nevertheless, the environmental noise criteria identified in Table 5 are predicted to be achieved without any potential influence from any such barriers, and therefore noise from the use of Ranford Road Station car park is not expected to cause disturbance to the nearby noise-sensitive receivers.

4.1.4 PASSENGER NOISE

The station is anticipated to have around 3210 passengers per day by 2031. The highest passenger volume is expected during the morning peak hour period, with 1,268 boardings and 179 alightings. For TCL, the peak 15-minute period has 27% of the peak one-hour demand i.e. 342 boardings and 48 alightings. This equates to around 390 passengers on the station platform for a 15-minute period.

On the basis that the gender split is 50%/50%, and that half the passengers would be speaking in normal voices at any one point in time, the predicted noise levels from passengers at the nearest noise-sensitive receptors are as follows:

- North 21 dB(A)
- East 31 dB(A)
- South 27 dB(A)

These predicted noise levels are well below the day-time environmental noise criteria, and therefore noise from passengers on the Ranford Station platform is not expected to cause disturbance to the nearby noise-sensitive receivers.

4.2 ROAD AND BUS MOVEMENT IMPACTS TO SURROUNDING SENSITIVE PREMISES

The connection road between the proposed new car park and Ranford Road, along the new Jandakot East Link Road (JELR) as well as the bus movements along Ranford Road, are required to be assessed against the road traffic requirements of the SPP 5.4.

The following inputs to the road and bus noise assessment have been taken from the NEWest transport planning report *Ranford Road Station Transport Assessment DRAFT.Rev A for NEWest Reviews 03.07.2020*

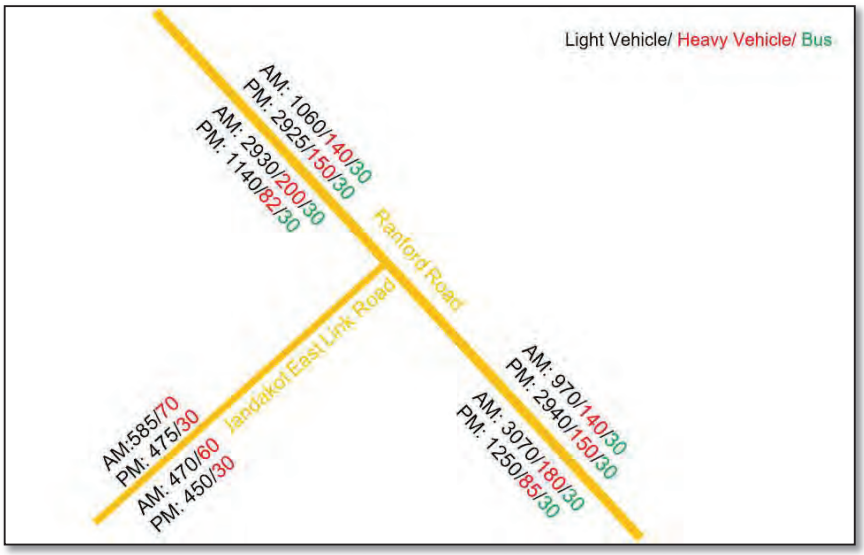


Figure 6 Estimated 2031 Peak Hour Background Traffic Forecast on Ranford Road and JELR

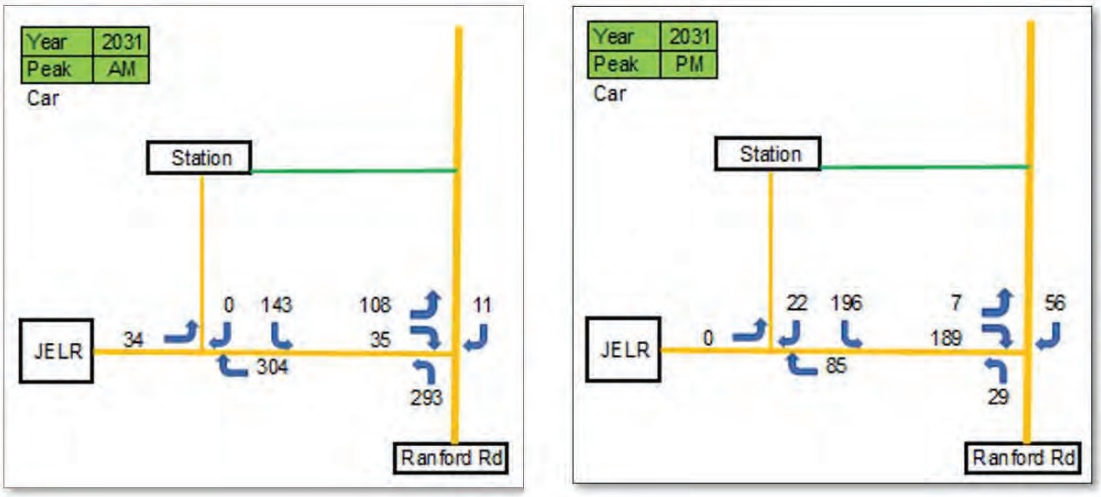


Figure 7 2031 Ranford Road Station PnR and KnR Traffic Distribution

Approximately 96% of vehicle movements would occur during the daytime period.

On the basis of these movements, the predicted vehicle movement noise levels with the station precinct are as follows:

- North $L_{Aeq\ (Day)}$ 41 dB(A), $L_{Aeq\ (Night)}$ 38 dB(A)
- East $L_{Aeq\ (Day)}$ 49 dB(A), $L_{Aeq\ (Night)}$ 46 dB(A)
- South $L_{Aeq\ (Day)}$ 51 dB(A), $L_{Aeq\ (Night)}$ 48 dB(A)

Therefore, the road traffic noise criteria of $L_{Aeq\ (Day)}$ 55 dB(A) and $L_{Aeq\ (Night)}$ = 50 dB(A) are expected to be achieved at the nearest noise-sensitive receivers to the Ranford Road Station. Therefore, no further consideration of noise control measures is required.

APPENDIX J PUBLIC ART SUMMARY

NEWest Alliance

TCY Public Art Summary Statement for DA Planning Reports

DRAFT 1.2, 12 Aug 20

For inclusion into the following applicants:

- Thornlie Station
- Yanchep Station
- Eglinton Station
- Alkimos Station
- Nicholson Road Station
- Ranford Road Station.

Public Art in new Stations

Scope of Work for Public Art

The State Government's Percent for Art Scheme encourages art in the built environment by using a percentage of a development's overall budget to commission art on new public buildings such as schools, hospitals and railway stations. As such, the Percent for Art Scheme requires up to 1% of the construction budget for new works over $2 million to be spent on artwork.[1]

METRONET Stage 1 program of works is supported by an endorsed Yanchep Rail Extension & Thornlie-Cockburn Link Projects Public Art Strategy (April 2020), which is itself informed by the overarching METRONET Public Art Strategy (October 2019). These strategies draw inspiration from and respond to Perth's rich Aboriginal and local culture, history, landscape and place, with a thematic framework built around the Gnarla Biddi story of 'Our Pathways'.

The purpose of the Public Art Strategy for METRONET Stage 1 is to provide the NEWest Alliance with direction regarding the procurement, management and funding of public art installations for the Yanchep Rail Extension (YRE) and Thornlie-Cockburn Link (TCL) projects. The role of public art in these projects will be to enhance the physical public realm of the new stations, as well as providing the opportunity to contribute to a community's identity and 'sense of place' through responding to its cultural, historical, and environmental narratives.

In approaching the designing and development of the new railway stations, as both important public buildings and major transport hubs, it is acknowledged that public art that responds to the uniqueness of its site and is creatively integrated within the public realm has the ability to celebrate and connect with its local people, as well as attract, inform and educate commuters from the wider community.

The principles and objectives of METRONET'S Public Art Principles and Strategy Framework that will be applied to the public art developed in each new station are as follows:

METRONET Public Art Principles

- Place making: public art is to contribute to the place making of a location and the interpretation

[1] Actual budgetary allowance will be reassessed by the PTA upon the engagement of, and with input from, the Public Art Coordinator and pending responses from the artists' concept proposal submissions.

of a place. It can aid the understanding of history or cultural heritage, assist how people currently understand or use the space, or provide new meanings.

- Site specific: artworks are to be designed specifically for the site and are to be responsive to the site context - its surrounds, its use and users, and reflecting the relevant precinct art themes from the Public Art Guide.
- Scale and fit: the scale of artwork needs to be consistent with the artwork brief/intent - i.e. it could be a landmark piece, a series or pieces, or a small element of surprise. Artwork scale also needs to be responsive to the site context - such as the surrounding landscape and buildings and pedestrian circulation.
- Universal accessibility: public art should be made accessible to all members of the community, irrespective of their age, abilities or cultural background.
- Attractor: public art can be used as an "attractor" for visitors and tourists – particularly places with landmark artworks or seasonal art programmes.
- Sustainable: art is designed considering key environmental, social and economic opportunities for both procurement/delivery and ongoing function and use.
- Well considered and managed: artworks must be designed and constructed with best practice risk and asset management, being mindful of public safety, straightforward and low cost maintenance, resistance to vandalism, and constructed with robustness appropriate for the lifespan of the artwork.

METRONET Public Art Strategy Objectives

- Drive the delivery of a diverse program of high quality progressive, bold, meaningful and inspiring public art that is valued by the community.
- Support the appeal and legibility of public spaces connected to stations and other transport infrastructure by creating points of interest, supporting walkability and building a sense of adventure.
- Showcase local culture, build place identity and animate public spaces to make them a more enjoyable.
- Celebrate, respect and acknowledge Australia's First People by promoting, engaging and responding to local Aboriginal culture, community, heritage and history.
- Encourage creativity and innovation and support the development of creative capital and sustainability of the local arts sector.
- Leave a positive project legacy to acknowledge the significance of METRONET.

In addition, the Gnarla Biddi METRONET Aboriginal Engagement Strategy also critically informs all landscaping and architectural design elements including the creation of public art at each new station, as guided by the following interrelated context setting documents:

- METRONET Noongar Cultural Context – Wadjup Thornlie-Cockburn Link Project; and
- METRONET Noongar Cultural Context – Yanchep (Mooroo) Rail Extension Project.

Public art for Placemaking

The brief for the development of public art in any station is that it must be integral to vibrant, usable and activated spaces, that aids understanding of place, history, cultural heritage (Noongar and non-Noongar) and provides new interpretations. As such, the design of public artworks is to fulfil the following objectives and guiding principles of:

- To promote community engagement

- To enable community capacity building
- To ensure safety
- To support wayfinding.

METRONET public art guiding principles

Delivery Program for Public Art

The Public Art Strategy for TCL and YRE is to guide the engagement of the Public Art Coordinator, which will have responsibility for implementing the strategy into the development of each new station project. The scope of the Public Art Coordinator's role in implementing the strategy includes:

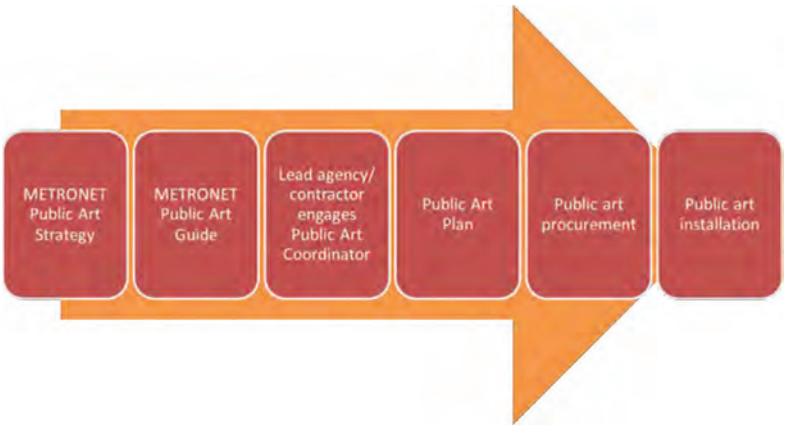
- Coordination and management of all aspects of the artist procurement, design, development, installation and commissioning of all station artwork projects.
- Producing a Public Art Plan each for the YRE and TCL that are in line with the METRONET Public Art Strategy and Gnarla Biddi METRONET Aboriginal Engagement Strategy.

  Public Art Plans are to include a Sense of Place Statement (n.b. may be a separate document) for each station that draws on the different cultural, geographical, sociological, environmental and historical narratives from the surrounding local area. The Sense of Place Statement sets the curatorial vision for each station's artwork, parameters for its integration, a delivery guide, fabrication details and budget for the artwork at each station.
- Preparation of tender documentation, which will include Artwork Brief and Expression of Interest (EOI) documents; and then coordination of artists during the design and development process, to ensure that the public art produced for the project satisfies the requirements as described in the EOI and briefing documents.
- Collaboration and liaison with relevant internal and external stakeholders, the design and construction project teams, and public consultation if required. Key stakeholders that have been identified include, but are not limited to, the following:
  - PTA,
  - METRONET Office,
  - METRONET Noongar Reference Group, and
  - the Local Government specific to each station's locality.
- Assisting the artist with preparing any documentation for building certification and permits, if required.

For artwork to be successfully integrated within the station's landscaping, infrastructure and building design - the Public Art Coordinator and artist(s) will be engaged during the project's detailed design phase. The proposed timeframe for delivery of artwork is to be in line with the project's construction program, an in summary involves the following stages:

- engagement of Public Art Coordinator
- production and approval of Public Art Plans, EOI and Artwork Brief documents

- advertising of EOI and shortlisting of artist's concept proposal submissions for selection
- commissioning of artists
- 50% design assessment
- fabrication completion
- installation of artwork.



METRONET public art process

Timing of Implementation for Planning and Building Development Approvals

Given the robustness and timeframe of the public art delivery program, it is recommended that the public art component of the project be delivered prior to the commissioning and opening of the new station, as this enables synchronisation with other nontangible community development actions associated with leading up to and on Day One Operations.

As such, details of the ultimate public art installations proposed will be documented for the purposes of satisfying the condition in plan and elevation drawings, along with an associated artist design report. Together, the drawings and report materials will need to demonstrate that the proposed public art installations can be properly integrated with the approved architecture and landscaping of the station precinct.

Consequently, the following draft condition is provided for consideration in any resulting development approval:

> *Public art is to be provided in accordance with the State Government's Percent for Art Scheme, details of which are to be submitted prior to occupation, to the satisfaction of the WAPC in consultation with the Local Government.*

APPENDIX K COMMUNITY & STAKEHOLDER CONSULTATION SUMMARY

NEWest Alliance

TCL Community and Stakeholder Consultation Summary Statement for DA Planning Reports

DRAFT 1.1, 14 Aug 20

Overview

The NEWest Alliance strategic approach to engagement is based on the International Association of Public Participation (IAP2) Consultation Spectrum. Stakeholders are profiled and the engagement methodology tailored to provide the appropriate level of involvement in the project's designing and decision-making processes.

Since the 2017-18 State Budget announcement confirming funding for the Thornlie-Cockburn Link (TCL) and Yanchep Rail Extension (YRE), engagement with stakeholders has been undertaken by the Public Transport Authority (PTA) and the METRONET Office of the Department of Planning, Lands and Heritage (DPLH).

Since the awarding of the contract in November 2019, NEWest Alliance has further developed the reference designs for each station in consultation with the community and key stakeholders through a series of briefings, technical workshops, reference groups and responses to enquiries.

Key Statistics

Between 1 November 2019 to 31 July 2020, the NEWest Alliance had 193 interactions with 179 distinct stakeholders.

The greatest proportion of stakeholders consulted were from local government authorities (19%), community members (19%) and local residents (16%), followed by state government (7%) and organisations/institutions (6%).

The main mechanisms for engagement were email enquiries (28%), email responses (14%), phone enquiries (10%) and phone responses (8%).

Meetings with stakeholders, key stakeholders and residents made up another 13% collectively.

Consultation Program Summary

Level	Engagement	Stakeholder/s	Topic/Discussion	Timing
Strategic	METRONET Local Government Reference Group – executive level	City of Cockburn, City of Gosnells, City of Canning, METRONET Office, NEWest Alliance	Introduction to the NEWest Alliance Project interface, statutory planning, development applications, communications	Quarterly
	METRONET Noongar Reference Group	Whadjuk Noongar community representatives, METRONET Office, NEWest Alliance	Introduction to the NEWest Alliance Thornlie Cockburn Link design workshop	Quarterly and as required

Level	Engagement	Stakeholder/s	Topic/Discussion	Timing
	METRONET Access and Inclusion Reference Group	METRONET Office, Department of Communities, Housing Advisory Unit, PTA, AIRG representatives	Introduction to the NEWest Alliance Lifts, respite seating, accessibility of car bays, drop off areas	Quarterly and as required
	Local member engagement	Yaz Mubarakai Chris Tallentire Terry Healey	Construction, Design, Environment, Community	Quarterly (briefing packs delivered as alternative depending on preferences)
Operational	Local Government Briefings – officer level	City of Cockburn City of Melville City of Canning City of Gosnells City of Melville Town of Victoria Park	Construction, Design, Environment, Community, Approvals	Quarterly (briefing packs were delivered as alternatives to those LGA briefings impacted by COVID)
	Technical / targeted workshops	Water Corporation Telstra Western Power ATCO Gas Environmental Protection Agency DevelopmentWA Transperth DFES Urban Quarter Eglinton Estates Friends of Ken Hurst Park	Design, Construction Staging, Approvals	Fortnightly, Monthly or as required
	Targeted Station Working Groups	Nicholson Road Ranford Road Thornlie Station	Design – civil, structures, access arrangements	Fortnightly, Monthly or as required
	Technical / targeted workshops	Water Corporation Telstra Western Power ATCO Gas APO BP	Design, Construction Staging, Approvals	Fortnightly, Monthly or as required

Level	Engagement	Stakeholder/s	Topic/Discussion	Timing
		Vocus Environmental Protection Agency DevelopmentWA Transperth DFES Main Roads WA		
Tactical	Thornlie Cockburn Link Community Reference Group (East)	City of Gosnells, local residents and schools	Construction, Design, Communications	Quarterly
	Thornlie Cockburn Link Community Reference Group (West)	City of Cockburn, local residents and schools	Construction, Design, Communications	Quarterly
	Thornlie-Cockburn Link Communications Coordination Meeting	City of Gosnells, City of Canning, City of Cockburn, Main Roads WA, METRONET Office, PTA, NEWest Alliance	Communications / cross promotional opportunities	Quarterly

Face to face engagement has been supported by communication campaigns and response to enquiries. Approximately 3755 notifications have been distributed to local residents and business to inform them of early works, geotechnical investigation, and temporary traffic changes with a further 178 properties directly engaged via doorknocks.

Pre-Lodgement Meetings for Station Planning and Development Approval

Station	Responsible Authority	Date
Perth Stadium	Town of Victoria Park / DPLH for JDAP	3 Aug 20
Nicholson Road*	City of Gosnells / DPLH for WAPC*	13 Jul 20
Thornlie	City of Gosnells / DPLH for JDAP	7 Jul 20
Ranford Road*	City of Canning / DPLH for WAPC*	20 Jul 20
Cockburn Central	City of Cockburn / DPLH for JDAP	2 Jul 20

Note: * Project development site is located within a Planning Control Area (PCA).

Upcoming Alliance Communication and Engagement

- Community Drop-In sessions planned to be held locally over two Saturdays, 10 October 2020 (venue Lakeside Recreation Centre Function Hall, Bibra Lake) and 17 October 2020 (venue

Mills Park Centre Function Hall, Beckenham)

The drop-in sessions will give the community an opportunity to find out more about the project's progress and plans, ask specific questions and raise concerns as well as understand how the project will help revitalise Perth's southern suburbs.

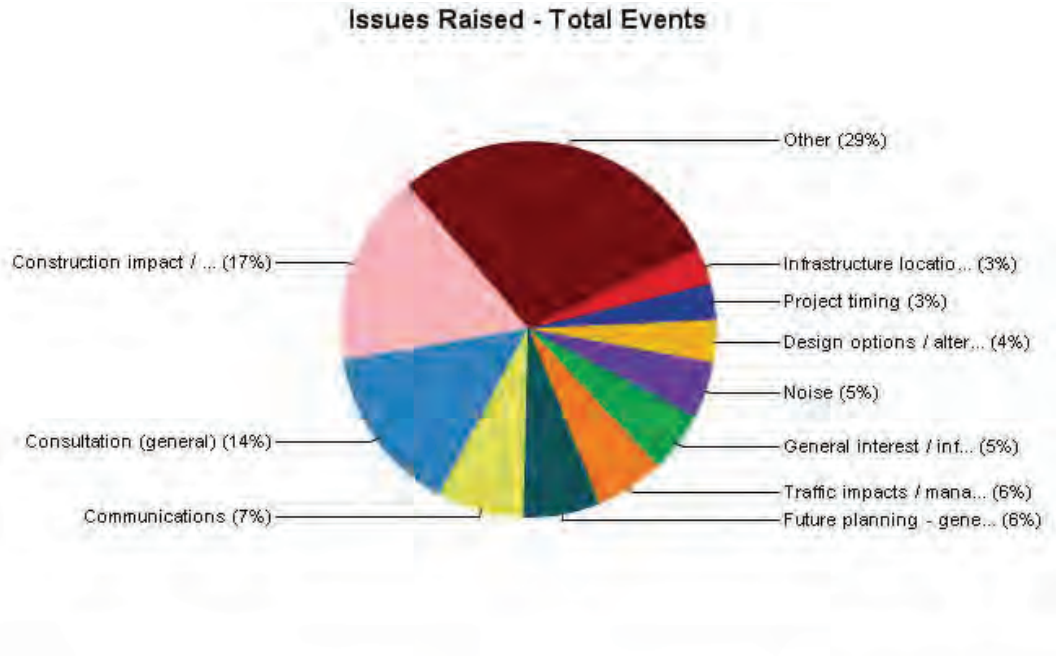
- Business readiness workshops
- Targeted resident engagement re design impacts (e.g. noise walls and footbridge)
- Fact sheets/construction updates (by zone) / release of renders and Augmented reality
- Property precondition surveys to 50 metres
- Site mobilisation engagement
- Quarterly briefings October 2020
- Postcode wide distribution of Project Updates planned for September 2020, to the following suburbs: Cockburn Central, South Lake, Bibra Lake, Jandakot, Leeming, Canning Vale, Thornlie, Beckenham
- METRONET Local Government Reference Group – TCL Design Workshop.

Thornlie-Cockburn Link (TCL) Consultation Outcomes Statistics

Date Range 1 November 2019 to 31 July 2020

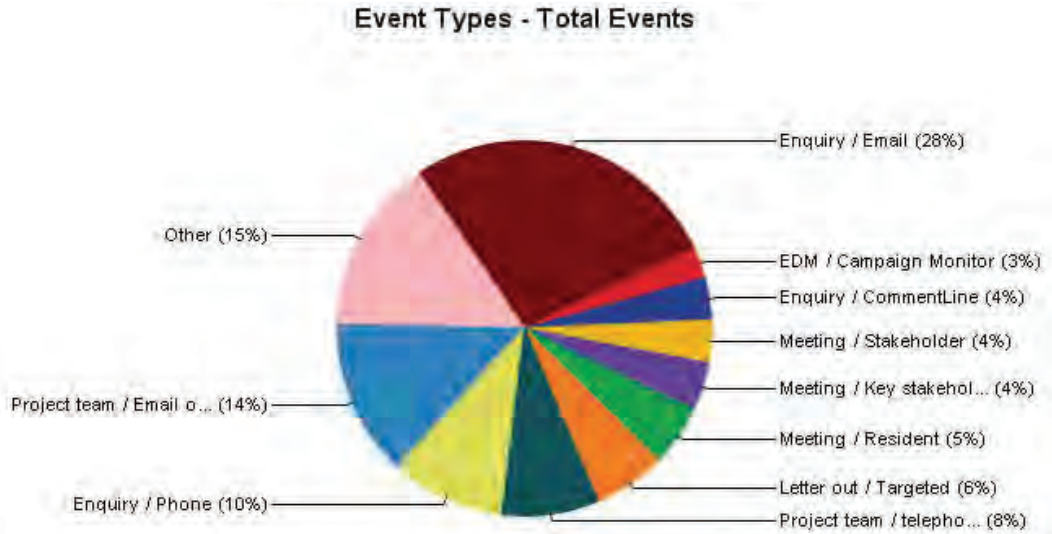
Key Issues Raised

Issues	Events	Stakeholders	
		Distinct	Total
Construction impact / notices	64	53	66
Consultation (general)	56	85	124
Communications	29	50	63
Future planning - general	25	30	37
Traffic impacts / management	23	16	20
General interest / information	20	16	18
Noise	19	18	19
Design options / alternatives	14	12	14
Project timing	12	18	18
Infrastructure location	12	12	13
Other	113	127	134
[No Issues]	4	3	3
Total Events	**193**	**179**	**271**



Event Types

Event Types	Events	Stakeholders	
		Distinct	Total
Enquiry / email	53	47	66
Project team / email out	26	45	50
Enquiry / Phone	19	16	19
Project team / telephone out	16	20	23
Letter out / targeted	12	0	0
Meeting / resident	10	14	15
Meeting / key stakeholder	8	21	27
Meeting / stakeholder	7	12	14
Enquiry / CommentLine	7	7	7
EDM / Campaign Monitor	5	0	0
Other	29	42	44
[No Event Types]	1	6	6
Total Events	**193**	**179**	**271**



Stakeholders Consulted

Stakeholder Groups	Events	Stakeholders	
		Distinct	Total
Local Government	46	38	69
Community member / local resident	45	50	71
Affected owner/occupier	39	28	40
General public	19	16	19
State Government	16	13	25
Institutions / organisations	14	7	16
Local business	11	15	15
Community Reference / Advisory Group member	9	21	34
Private industry	9	5	9
PTA project staff	9	4	10
Other	23	21	25
[No Stakeholder Groups]	16	36	48
Total Events	**193**	**179**	**271**

APPENDIX L SUMMARY OF ENVIRONMENTAL APPROVALS

NEWest Alliance

TCL Environmental Strategies Summary Statement for DA Planning Reports

DRAFT 1.0, 22 Sep 20

METRONET's Thornlie-Cockburn Link (TCL) duplicates three kilometres of track between Beckenham Station and Thornlie Station, relocates 11 kilometres of freight track, builds 14.5 kilometres of new passenger rail between Thornlie and Cockburn stations and two new stations at Nicholson Road and Ranford Road. The project is the catalyst for the medium to long-term redevelopment in the area. As the project is located within a well populated urban corridor, there is a focus on minimising environmental and community impacts during its construction and subsequent operation. While a new railway is itself a sustainability initiative, construction of such major public transport infrastructure is overseen by a raft of both environmental and public health requirements - governing hours of work, the management of noise, vibration and dust, and the need to working together with communities in developing measures that will minimise impacts.

Flora and Fauna

The existing rail freight corridor has been largely cleared of native vegetation. However, some clearing is required and environmental approvals for this work have been obtained under the *Environmental Protection Act 1986*. The design has been optimised to limit any new clearing to only that required to safely construct the permanent footprint.

The project footprint has also been adjusted where possible to avoid significant ecological communities. Where this could not be achieved, areas of offset vegetation have been obtained elsewhere and funds have been allocated to manage those environmental offsets in perpetuity.

Prior to clearing, a trapping and relocation program will be undertaken by a qualified ecologist. Native animals will be relocated to nearby suitable habitat, as approved by the Department of Biodiversity, Conservation and Attractions.

Aboriginal Heritage

Duplicating the rail bridge over the Canning River, known as the Dyarlgarro by Noongar people, will occur within an identified Aboriginal heritage site. While the impact is expected to be minimal, recognising the importance of this site to the Whadjuk people, relevant approvals have been sought.

Specialist Aboriginal monitoring personnel will also be engaged during the initial ground work at this location to further ensure that any culturally significant material, if uncovered, is managed appropriately.

Environmental Controls

There are numerous controls in place for the different stages of the project to mitigate potential environmental impacts. A combination of legislative, planning and construction controls, and monitoring govern the project with the aim of protecting the environment during construction and delivery. These controls include:

- limiting noisy works outside of normal working hours, where practicable and using construction techniques and work practices that generate lower noise levels.
- monitoring of dust, noise and vibration during construction.
- using water trucks and water sprays to suppress dust.
- reducing the number of vehicle movements and maintaining low speed limits for construction

vehicles, machinery and equipment.

- doing property pre-condition surveys to record the condition of buildings and structures within 50 metres of the project site.
- placing vibration monitoring equipment to monitor vibration levels against compliance limits.
- marking all clearing boundaries by surveyors prior to commencing clearing.
- fauna trapping and relocation prior to clearing, and the presence of fauna spotters during clearing.
- barricading and signage to clearly outline 'no-go' areas.
- adhering to required regulatory legislative approvals and associated conditions.
- environmental monitoring, inspections and audits to confirm compliance with approvals and legislation.
- Environmental training and awareness incorporated into induction for all personnel, subcontractors and visitors to site.
- Notifying and keeping local residents, businesses and road users informed of upcoming construction activities through a number of media and communication channels.

Controls will be inspected regularly throughout the project duration to ensure their ongoing suitability and effectiveness.

Managing Noise, Vibration and Light During Construction and Operation

Potential construction impacts, including noise, vibration and light related impacts, will be minimised as much as possible. All works will be planned with the community in mind and will follow the project's approved management processes.

Every effort is made to minimise noise and vibration during out-of-hours works and local residents will be informed about upcoming activities. Where out of hours works are required, they will be undertaken in accordance with a Noise and Vibration Management Plan approved by the relevant Local Government Authority. This plan will outline additional controls and community notification requirements.

Work is also underway to minimise the operational noise and vibration levels from the new electric passenger lines for the surrounding community. Based on early designs, an initial operational noise and vibration assessment recommends noise barriers in certain locations and anti-vibration ballast matting. Ballast matting (matting that sits in the rail formation) will be installed under the rail where it is located next to existing and future residential developments. This matting absorbs vibrations made by the train and will be used under both the freight and passenger tracks. This approach will continue to be reviewed and updated as the detailed design progresses.

Noise walls will also be used in existing residential developments to assist with noise mitigation for residents living near to the trainline. The project team is currently confirming the height, materials and location of the noise walls along the alignment.

Lighting of the station areas will be directed away from residential properties as much as possible and will be assessed during the final design stages.

Revegetation and Landscaping

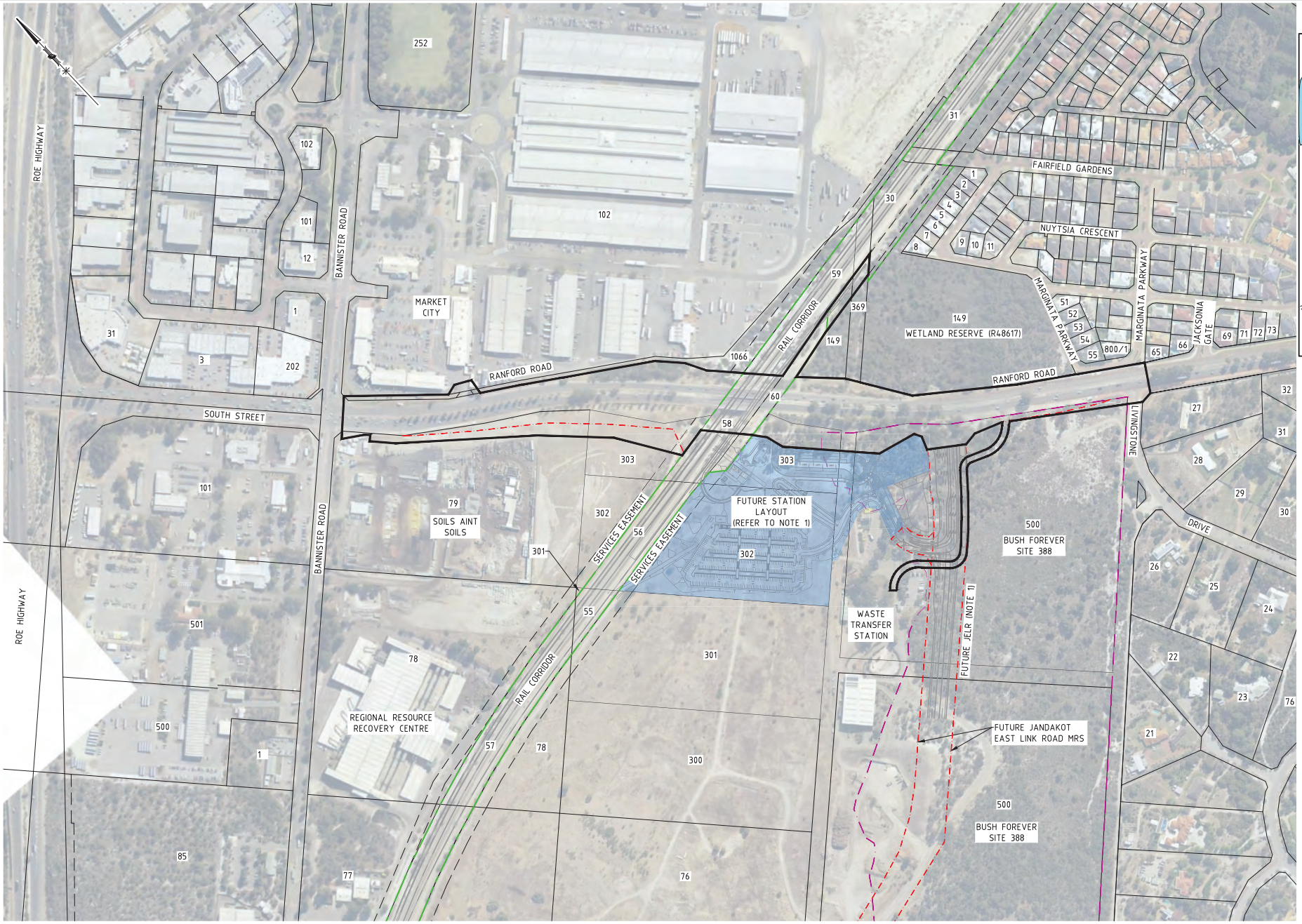
All areas disturbed by the construction process that are not part of the permanent infrastructure will be revegetated as part of a landscape design produced by a landscape architect. The landscape

design will provide quality landscape and urban design solutions which integrate the rail development and station precincts with the surrounding natural areas.

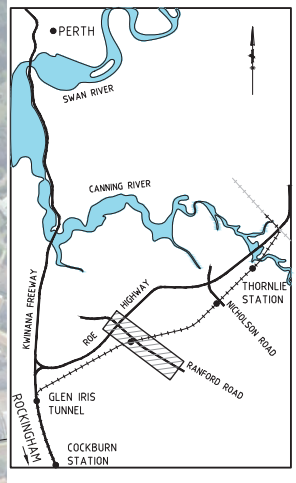
Revegetation and landscaping measures will include some or all of the following measures:

- reuse of topsoil from clearing during revegetation and landscaping.
- maintenance of the required groundwater hydrology where needed to support existing vegetation and habitats in sensitive areas.
- application of mulch to revegetated and landscaped areas to improve vegetation success.
- retention of vegetation where not impacted by earthworks and not posing a safety risk.

APPENDIX M DEVELOPMENT PLANS FOR SUPPORTING EXEMPT WORKS



LOCALITY PLAN



NOTES

1. FUTURE RANFORD ROAD STATION LAYOUT AND FUTURE JANDAKOT EAST LINK ROAD SHOWN FOR INFORMATION PURPOSES ONLY, AND DO NOT FORM PART OF THIS APPLICATION.
2. PROPOSED ROAD RESERVE BOUNDARY IS SUBJECT TO CHANGE BASED ON FURTHER DESIGN AND INVESTIGATION.

LEGEND

- FORWARD WORKS PLANNING BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- 51 EXISTING LOT NUMBER
- EXISTING BUSH FOREVER BOUNDARY
- PROPOSED ROAD RESERVE BOUNDARY (REFER TO NOTE 2)
- RAIL CORRIDOR BOUNDARY
- FUTURE RANFORD ROAD STATION FOOTPRINT (REFER TO NOTE 1)

0 25 50 75 100 125 250
SCALE (m) 1:2500 (A1) ; 1:5000 (A3)

DETAILED DESIGN

REV	DATE	AMENDMENT	DP	DP	BS	PT
A	26.06.20	ISSUED FOR FORWARD WORKS PLANNING APPROVAL	DSN	DRN	CHKD	APP

ORIG SIZE A1 — 0 10 20 30 40 50 100mm — AT ORIGINAL PLOT SIZE

NEWest Alliance

TCY-DJV-TSC-CI-SKT-2600

REFERENCES

SCALE : 1:2500 (@ A1)

DATUM : HORIZONTAL: PCG20 VERTICAL: AHD71

PTA ACCEPTANCE STAMP

DESIGNED DR
DRAWN DP
CHECKED BS

APPROVED FOR ISSUE
EXECUTIVE DIRECTOR
PTA Division / External Company
DATE

Government of Western Australia Public Transport Authority

THORNLIE COCKBURN LINK

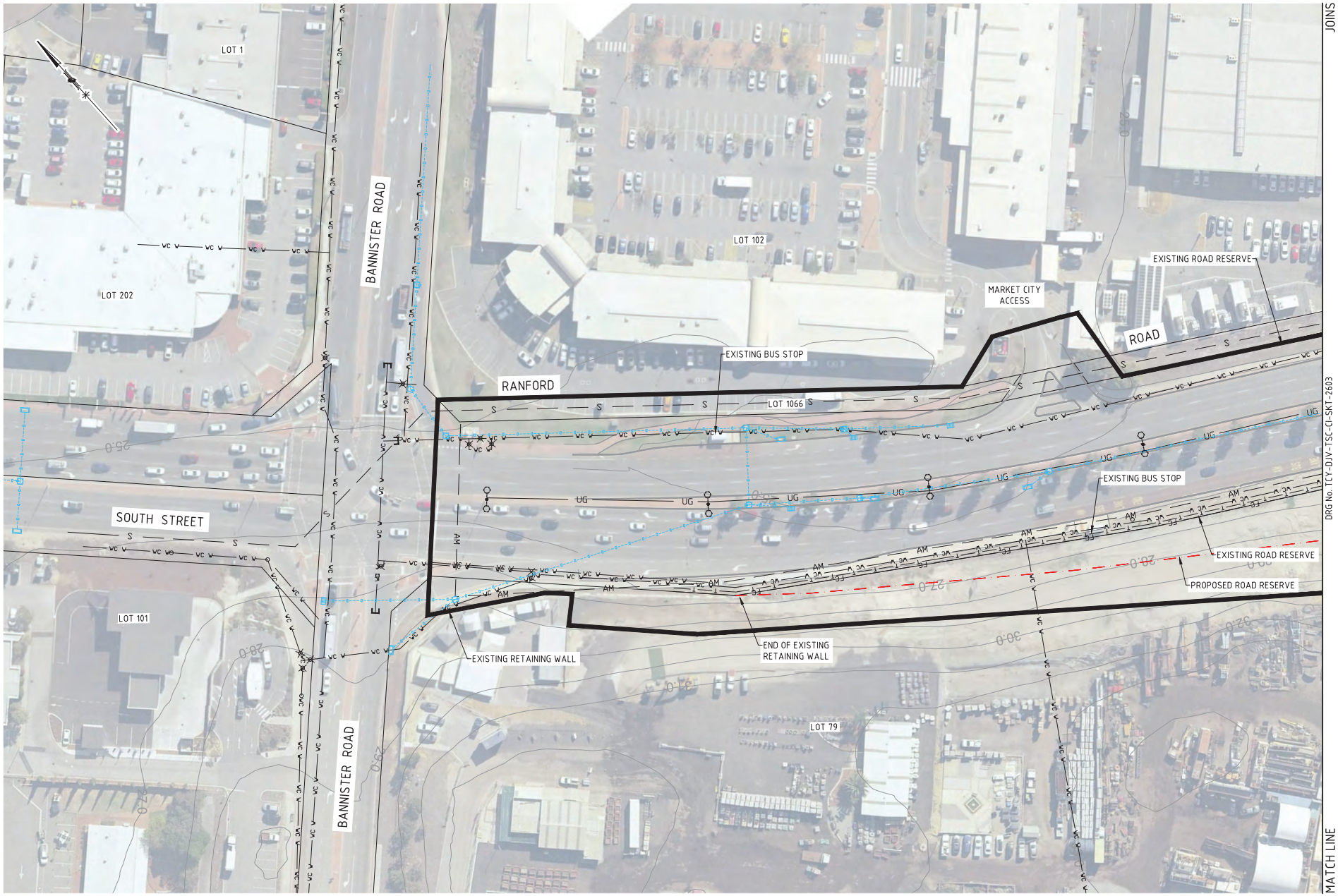
RANFORD RD CORRIDOR FORWARD WORKS PLANNING APPROVAL

SITE ANALYSIS AND CONTEXT PLAN

OVERALL LAYOUT

PTA Drawing No: REV : A

CAD DRAWING PATHNAME C:\Dms\metronettcy\dusko.petrovich\dms16428\TCY-DJV-TSC-CI-SKT-2600.dwg



NOTES

1. EXISTING TREES LOCATED WITHIN THE DEVELOPMENT AREA BOUNDARY ARE TO BE REMOVED, SUBJECT TO FURTHER TREE SURVEY AND DETAILED LANDSCAPING PLAN DEVELOPMENT.
2. PROPOSED ROAD RESERVE BOUNDARY IS SUBJECT TO CHANGE BASED ON FURTHER DESIGN AND INVESTIGATION.

LEGEND

- FORWARD WORKS PLANNING BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- LOT 51 — EXISTING LOT NUMBER
- 32.0 — EXISTING CONTOURS (m)
- EXISTING BUSH FOREVER BOUNDARY
- PROPOSED ROAD RESERVE BOUNDARY (REFER TO NOTE 2)
- RAIL CORRIDOR BOUNDARY
- EXISTING DRAINAGE
- EXISTING STREET LIGHT POLE

EXISTING UTILITIES LEGEND

- O — OPTUS
- UG — WESTERN POWER UNDERGROUND POWER
- OH — WESTERN POWER OVERHEAD POWER
- T — TELSTRA
- WC W — WATER CORPORATION WATER
- S — WATER CORPORATION SEWER
- OIL — BP PIPELINE
- G_CMS — APA GAS
- GAS — ATCO GAS
- FC — ARC RAIL SIGNALING
- AM — DATA (VOCUS)

PLAN
SCALE 1:500

SCALE (m) 1:500 (A1) ; 1:1000 (A3)

DETAILED DESIGN

REV	DATE	AMENDMENT	DSN	DRN	CHKD	APP
A	26.06.20	ISSUED FOR FORWARD WORKS PLANNING APPROVAL	DP	DP	BS	PT

ORIG SIZE A1 — 0 10 20 30 40 50 100mm AT ORIGINAL PLOT SIZE

NEWest Alliance

TCY-DJV-TSC-CI-SKT-2602

REFERENCES
TCY-DJV-T00-CI-REF-0001_CAD
TCY-DJV-TSC-CI-REF-0001_XWDRY
TCY-DJV-TSC-CI-REF-0001_XCR
TCY-DJV-TSC-CI-REF-0001_LSS-GA-4C
TCY-DJV-TLC-TR-REF-0001_RAIL-SURVEY-PCG20
TCY-DJV-T00-UT-REF-0001_SER-EX
TCY-DJV-TLA-CI-REF-0001_DRN-E
TCY-DJV-TSC-CI-REF-0001_CONT-EX 3D
TCY-DJV-TLC-TR-REF-0001_RAIL-RESERVE-PCG20

SCALE : 1:500 (@ A1)
DATUM : HORIZONTAL: PCG20 VERTICAL: AHD71
PTA ACCEPTANCE STAMP

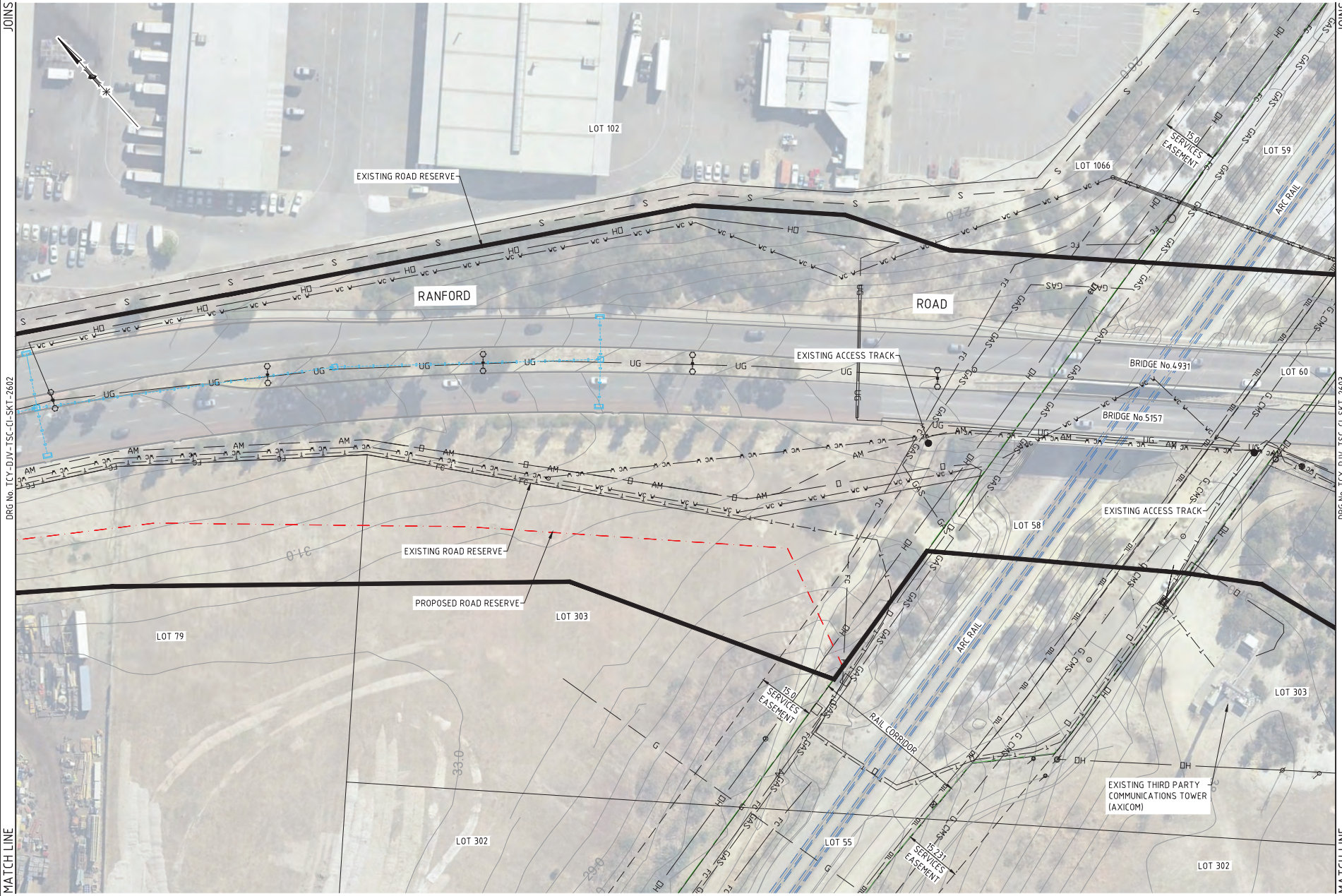
DESIGNED DR
DRAWN DP
CHECKED BS
APPROVED FOR ISSUE
EXECUTIVE DIRECTOR PTA Division / External Company
DATE

Government of Western Australia Public Transport Authority

THORNLIE COCKBURN LINK
RANFORD RD CORRIDOR FORWARD WORKS PLANNING APPROVAL
SITE FEATURE SURVEY MAP
SHEET 1 OF 4

PTA Drawing No:
REV : A

CAD DRAWING PATHNAME C:\bms\metronettcy\dusko.petrovich\dms16428\TCY-DJV-TSC-CI-SKT-2602-2605.dwg



NOTES

1. EXISTING TREES LOCATED WITHIN THE DEVELOPMENT AREA BOUNDARY ARE TO BE REMOVED, SUBJECT TO FURTHER TREE SURVEY AND DETAILED LANDSCAPING PLAN DEVELOPMENT.
2. PROPOSED ROAD RESERVE BOUNDARY IS SUBJECT TO CHANGE BASED ON FURTHER DESIGN AND INVESTIGATION.

LEGEND

- FORWARD WORKS PLANNING BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- LOT 51 — EXISTING LOT NUMBER
- 32.0 — EXISTING CONTOURS (m)
- EXISTING BUSH FOREVER BOUNDARY
- PROPOSED ROAD RESERVE BOUNDARY (REFER TO NOTE 2)
- RAIL CORRIDOR BOUNDARY
- EXISTING DRAINAGE
- EXISTING STREET LIGHT POLE

EXISTING UTILITIES LEGEND

- O — OPTUS
- UG — WESTERN POWER UNDERGROUND POWER
- OH — WESTERN POWER OVERHEAD POWER
- T — TELSTRA
- WC W — WATER CORPORATION WATER
- S — WATER CORPORATION SEWER
- OIL — BP PIPELINE
- G_CMS — APA GAS
- GAS — ATCO GAS
- FC — ARC RAIL SIGNALING
- AM — DATA (VOCUS)

PLAN

SCALE 1:500

SCALE (m) 1:500 (A1) ; 1:1000 (A3)

DETAILED DESIGN

REV	DATE	AMENDMENT	DSN	DRN	CHKD	APP
A	26.06.20	ISSUED FOR FORWARD WORKS PLANNING APPROVAL	DP	DP	BS	PT

ORIG SIZE A1

0 10 20 30 40 50 100mm AT ORIGINAL PLOT SIZE

NEWest Alliance

TCY-DJV-TSC-CI-SKT-2603

REFERENCES

TCY-DJV-T00-CI-REF-0001_CAD
TCY-DJV-TSC-CI-REF-0001_BNDRY
TCY-DJV-TSC-CI-REF-0001_ACR
TCY-DJV-TSC-CI-REF-0001_LSS-GA-4C
TCY-DJV-TLC-TR-REF-0001_RAIL-SURVEY-PCG20
TCY-DJV-T00-UT-REF-0001_SER-EX
TCY-DJV-TLA-CI-REF-0001_DRN-E
TCY-DJV-TSC-CI-REF-0001_CONT-EX 2D
TCY-DJV-TLC-TR-REF-0001_RAIL-RESERVE-PCG20

SCALE : 1:500 (@ A1)

DATUM : HORIZONTAL: PCG20 VERTICAL: AHD71

PTA ACCEPTANCE STAMP

DESIGNED	DR
DRAWN	DP
CHECKED	BS

APPROVED FOR ISSUE

EXECUTIVE DIRECTOR PTA Division / External Company

DATE

Government of Western Australia Public Transport Authority

THORNLIE COCKBURN LINK

RANFORD RD CORRIDOR FORWARD WORKS PLANNING APPROVAL

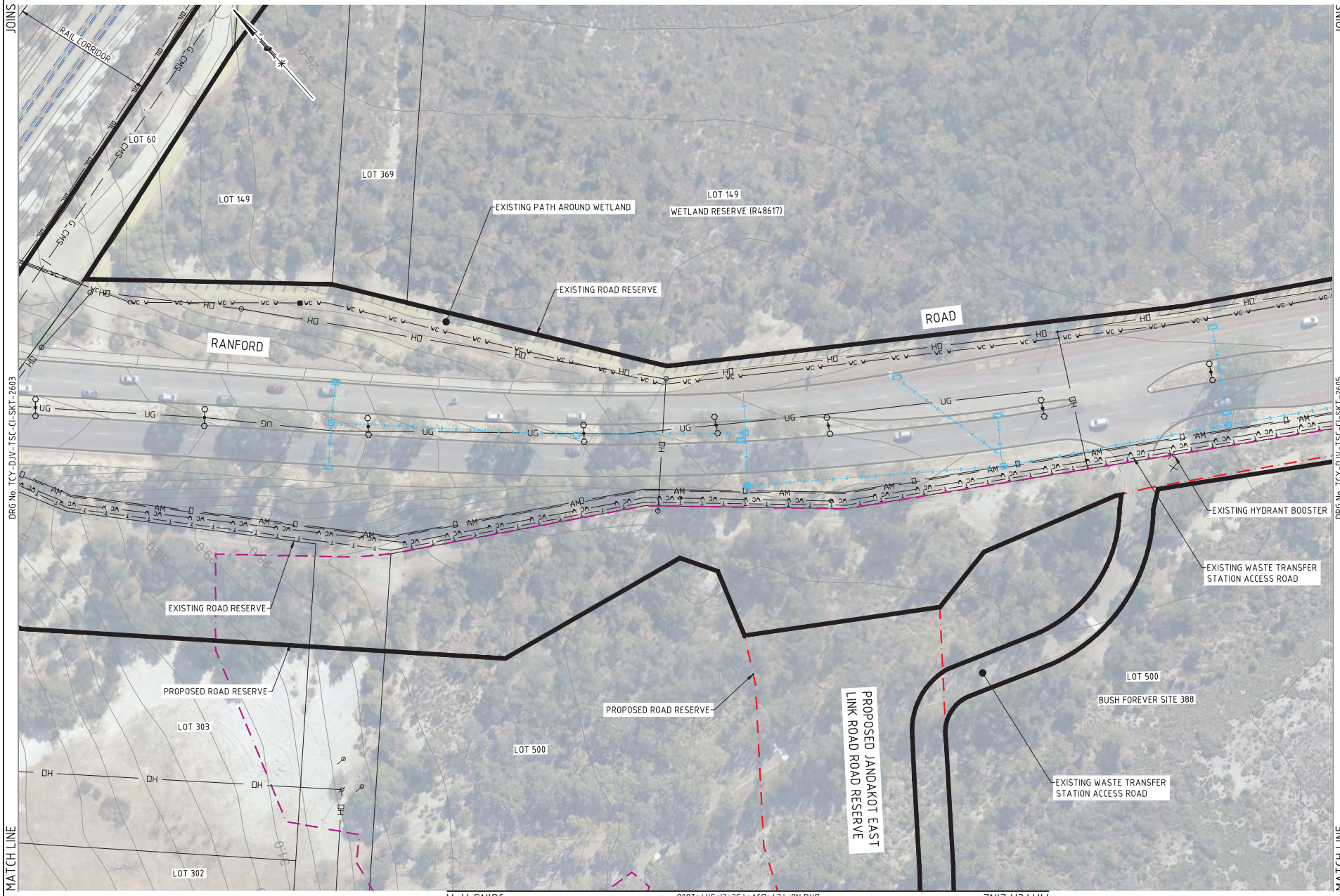
SITE FEATURE SURVEY MAP

SHEET 2 OF 4

PTA Drawing No:

REV : A

CAD DRAWING PATHNAME C:\bms\metronettcy\dusko.petrovich\dms16428\TCY-DJV-TSC-CI-SKT-2602-2605.dwg



NOTES

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LEGEND

- FORWARD WORKS PLANNING BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- LOT 51 — EXISTING LOT NUMBER
- 32.0 — EXISTING CONTOURS (m)
- EXISTING BUSH FOREVER BOUNDARY
- PROPOSED ROAD RESERVE BOUNDARY (REFER TO NOTE 2)
- RAIL CORRIDOR BOUNDARY
- EXISTING DRAINAGE
- EXISTING STREET LIGHT POLE

EXISTING UTILITIES LEGEND

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- WC W — WATER CORPORATION WATER
- S — WATER CORPORATION SEWER
- OIL — BP PIPELINE
- G_CMS — APA GAS
- GAS — ATCO GAS
- FC — ARC RAIL SIGNALING
- AM — DATA (VOCUS)

PLAN

SCALE 1:500

SCALE (m) 1:500 (A1) ; 1:1000 (A3)

DETAILED DESIGN

REV	DATE	AMENDMENT	DSN	DRN	CHKD	APP
A	26.06.20	ISSUED FOR FORWARD WORKS PLANNING APPROVAL	DP	DP	BS	PT

ORIG SIZE A1

0 10 20 30 40 50 100mm AT ORIGINAL PLOT SIZE

NEWest Alliance

TCY-DJV-TSC-CI-SKT-2604

REFERENCES

TCY-DJV-T00-CI-REF-0001_CAD
TCY-DJV-TSC-CI-REF-0001_XHDRY
TCY-DJV-TSC-CI-REF-0001_XCR
TCY-DJV-TSC-CI-REF-0001_LSS-GA-4C
TCY-DJV-TLC-TR-REF-0001_RAIL-SURVEY-PCG20
TCY-DJV-T00-UT-REF-0001_SER-EX
TCY-DJV-TLA-CI-REF-0001_DRN-E
TCY-DJV-TSC-CI-REF-0001_CONT-EX 2D
TCY-DJV-TLC-TR-REF-0001_RAIL-RESERVE-PCG20

SCALE : 1:500 (@ A1)

DATUM : HORIZONTAL: PCG20 VERTICAL: AHD71

PTA ACCEPTANCE STAMP

DESIGNED DR
DRAWN DP
CHECKED BS

APPROVED FOR ISSUE

EXECUTIVE DIRECTOR
PTA Division / External Company

DATE

Government of Western Australia Public Transport Authority

THORNLIE COCKBURN LINK

RANFORD RD CORRIDOR FORWARD WORKS PLANNING APPROVAL

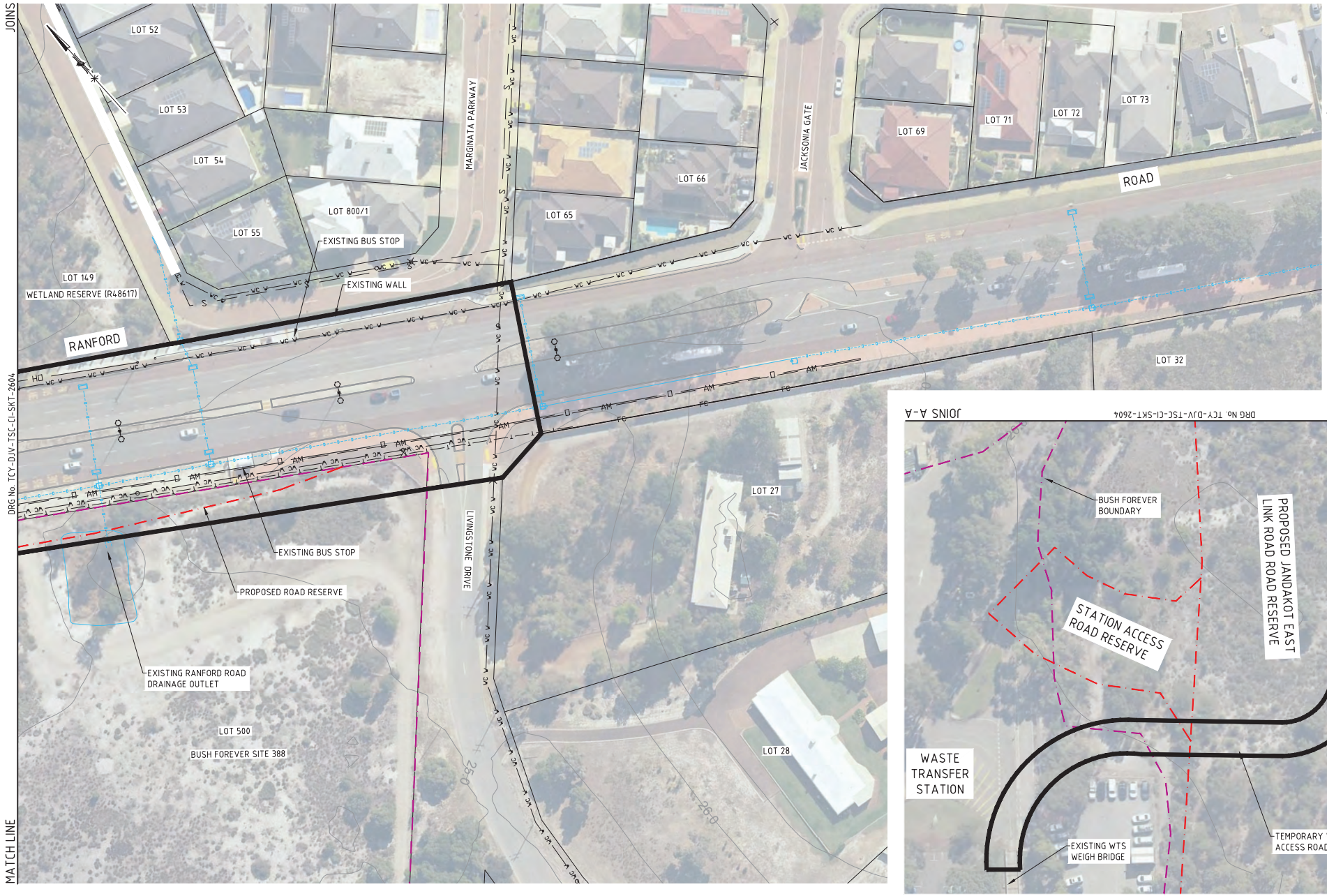
SITE FEATURE SURVEY MAP

SHEET 3 OF 4

PTA Drawing No:

REV : A

CAD DRAWING PATHNAME C:\bms\metronettcy\dusko.petrovich\dms16428\TCY-DJV-TSC-CI-SKT-2602-2605.dwg



NOTES

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LEGEND

- FORWARD WORKS PLANNING BOUNDARY
- EXISTING CADASTRAL BOUNDARY
- LOT 51 — EXISTING LOT NUMBER
- 32.0 — EXISTING CONTOURS (m)
- EXISTING BUSH FOREVER BOUNDARY
- PROPOSED ROAD RESERVE BOUNDARY (REFER TO NOTE 2)
- RAIL CORRIDOR BOUNDARY
- EXISTING DRAINAGE
- EXISTING STREET LIGHT POLE

PLAN
SCALE 1:500

SCALE (m) 1:500 (A1) ; 1:1000 (A3)

DETAILED DESIGN

REV	DATE	AMENDMENT	DSN	DRN	CHKD	APP
A	26.06.20	ISSUED FOR FORWARD WORKS PLANNING APPROVAL	DP	DP	BS	PT

ORIG SIZE A1 — 0 10 20 30 40 50 100mm AT ORIGINAL PLOT SIZE

NEWest Alliance

TCY-DJV-TSC-CI-SKT-2605

REFERENCES
TCY-DJV-T00-CI-REF-0001_CAD
TCY-DJV-TSC-CI-REF-0001_DWDRY
TCY-DJV-TSC-CI-REF-0001_ACR
TCY-DJV-TSC-CI-REF-0001_LCC-GA-4C
TCY-DJV-TLC-TR-REF-0001_RAIL-SURVEY-PCG20
TCY-DJV-T00-UT-REF-0001_SER-EX
TCY-DJV-TLA-CI-REF-0001_DRN-E
TCY-DJV-TSC-CI-REF-0001_CONT-EX 2D
TCY-DJV-TLC-TR-REF-0001_RAIL-RESERVE-PCG20

SCALE : 1:500 (@ A1)
DATUM : HORIZONTAL: PCG20 VERTICAL: AHD71
PTA ACCEPTANCE STAMP

DESIGNED DR
DRAWN DP
CHECKED BS
APPROVED FOR ISSUE
EXECUTIVE DIRECTOR PTA Division / External Company
DATE

Government of Western Australia Public Transport Authority

THORNLIE COCKBURN LINK
RANFORD RD CORRIDOR FORWARD WORKS PLANNING APPROVAL
SITE FEATURE SURVEY MAP
SHEET 4 OF 4
PTA Drawing No:
REV : A

CAD DRAWING PATHNAME C:\bms\metronetfcy\dusko.petrovich\dms16428\TCY-DJV-TSC-CI-SKT-2602-2605.dwg