

Thursday, 30 January 2025



Our Ref: P22.100A-LRP-FVSR- Tamala Park \_1\_FINAL

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ATTENTION: ██████████

**SUBJECT: PTA RADIO SYSTEMS REPLACEMENT (RSR) PROJECT – BIOLOGICAL ASSESSMENT,  
SITE #84 TAMALA PARK**

### **Project Background**

Western Environmental Pty Ltd (WEPL) was commissioned by UGL Engineering Pty Limited (the Client) to undertake Environmental Site Assessments (ESA) at several sites associated with the Public Transport Authority (PTA) Radio Systems Replacement (RSR) Project.

The RSR Project will upgrade the radio system of Perth's rail transport by replacing the existing analogue system with a digital system. This involves the installation of monopoles and new Western Power (WP) pillars across the rail network. The Project will help to deliver High Capacity Signalling, which will provide increased reliability and flexibility of trains, to support a more efficient rail network for Perth's growing population (Metronet, 2023).

The assessments undertaken included a desktop review of the environmental site conditions and relevant surrounding and historical land uses. Where relevant, site assessments for flora, vegetation and fauna were undertaken to identify present environmental values.

UGL has requested an additional six sites to be surveyed due to design changes and identified Western Power works required within the sites. The purpose of the biological assessment was to identify and qualify the existing vegetation in the areas and determine the project impacts within the proposed clearing footprints.

Based on the survey findings and the site reference designs provided by UGL, site #84 – Tamala Park was identified requiring a Native Vegetation Clearing Permit (NVCP) under Part V of the *Environmental Protection Act 1986* (EP Act). Site location and clearing extent are displayed in Figure 1.

**Table 1: Site Identification and Land Descriptions**

| Site Name                                 | Property Details   | Conservation Areas  |
|---|--|---|
| <b>Site #84</b><br><br><b>Tamala Park</b> | 200 Burns Beach Road, Neerabup<br><br>Lot 3323 P219820<br><br>Land ID Number: 2009185<br><br>LGA: City of Wanneroo | The area where the clearing footprint is located is mapped as:<br><br>Environmentally Sensitive Area (ESA): ID 18620<br><br>Bush Forever Site No. 383 |
|   | 2900 Mitchell Fwy, Neerabup<br><br>Lot 14043 P221400<br><br>Land ID Number: 3006111<br><br>LGA: City of Wanneroo   |   |







Figure 1: Site Location – Site #84 Tamala Park

|   |  |   |  |                                       |  |   |  |   |  |   |  |  |  |
|---|--|---|--|---------------------------------------|--|---|--|---|--|---|--|--|--|
| <div><div></div><div>016324864</div><div>m</div></div> <div>SCALE<br/>1:1,100</div> <div>SHEET SIZE<br/>A3 COLOUR</div> |  | PROJECT/REPORT NAME<br>Environmental Site Assessment<br>Site #51 Lake Walyungup |  | CLIENT<br>UGL Engineering Pty Limited |  | Legend<br>Survey Area<br>Clearing Footprint |  | No. Description Drawn Approved Date<br>A Original issue JP JB 20/1/2025 |  | NOTES:<br>Cadastral boundary (LGATE-002), Base map ESRI<br>Topo. Townships (LGATE-248). |  | <div><div></div><div>WESTERN<br/>ENVIRONMENTAL</div><div>Western Environmental Pty Ltd<br/>08 6244 2310   enquiries@western.com.au<br/>Level 3/25 Prowse St, West Perth WA 6005<br/>western.com.au</div></div> |  |
| COORDINATE REFERENCE SYSTEM<br>GDA2020 / MGA zone 50  |  | PROJECT NUMBER<br>P22.100A  |  | VERSION<br>0                          |  | DRAWN BY / REVIEWED BY<br>JP/JB             |  | DATE<br>20/1/2025   |  |   |  |  |  |
| DATA SOURCE<br>LANDGATE AERIAL IMAGERY Summer 2023  |  |   |  |                                       |  |   |  |   |  |   |  |  |  |



## Survey Methodology

A flora and vegetation assessment was undertaken on 18 October 2024. The following elements were assessed:

- Broad description of vegetation types, including broad species composition and weed invasion.
- Vegetation Condition in consistence with the EPA *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessments* (EPA, 2016).
- Opportunistic sampling of flora species where taxa could not be identified on Site.
- Presence of potential black cockatoo habitat values and other significant fauna habitat values.
- Presence of TECs, Threatened and Priority Flora and other Environmentally Sensitive Areas (ESAs).

## Results

The results of the assessment are presented in Table 2 and displayed in Figure 2 below.

Table 2: Tamala Park – Site Inspection Form

| Site Inspection Form      |  |           |                                 |   |
|---------------------------|--|-----------|---------------------------------|---|
| Date                      | 9 July 2024<br>18 October 2024   | Site Name | 84 –Tamala Park, Joondalup Line |   |
| Coordinates (GDA2020-Z50) | 378188.68, 6498420.29 (meter MGA 2020 Zone 50)   |           | Portion No.                     | 7 |
| Environmental Scientist   |  |           |                                 |   |
| Vegetation present        | Yes  |           |                                 |   |
| Vegetation description    | <p><u>Vegetation types intersecting with clearing footprint</u></p> <p>VT01 – Acacia shrubland: <i>Acacia rostellifera</i>, <i>Chamelaucium uncinatum</i> and <i>Melaleuca huegelii</i> with a ground cover layer of <i>Scaevola nitida</i>, <i>Olearia axillaris</i>, <i>Eremophila glabra</i> and <i>*Pelargonium capitatum</i>. Ground stratum covered by weeds.</p> <p>One isolated <i>Banksia sessilis</i> was found within the clearing extent (Figure 2).</p> <p>This vegetation was in Degraded condition.</p> <p>VT02 – Open shrubland: Geraldton wax (<i>Chamelaucium uncinatum</i>) over weeds, one isolated <i>Banksia sessilis</i> was found within the clearing extent (see Figure 2).</p> <p>This vegetation was in Degraded condition.</p> <p>VT03 – Acacia and <i>Banksia sessilis</i> Woodland: The vegetation in the Tamala Park Site to the west of the clearing boundary is dominated by <i>Acacia</i> sp. and <i>Banksia sessilis</i>. The upper and mid story is further comprised by, <i>Allocasuarina fraseriana</i> and <i>Nuytsia floribunda</i> with scattered <i>Banksia menziesii</i>, <i>Banksia attenuata</i>, and <i>Eucalyptus gomphocephala</i> over <i>Macrozamia fraseri</i>, <i>Hibbertia hypericoides</i> <i>Daviesia trifloral</i>, <i>Jacksonia sternbergiana</i>, <i>Templetonia retusa</i> and <i>Baeckea</i> sp. Limestone (P1).</p> <p>This vegetation was in Good condition.</p> |           |                                 |   |





| Site Inspection Form   |  |
|--|--|
|  | <p>VT03 is located outside the clearing extent. The site design was amended to avoid impacts to the vegetation type.</p> <p><i>Baeckea</i> sp. Limestone is listed as Priority 1 species by DBCA. The species was recorded from 9 locations outside the clearing extent. Abundance ranged from 1 to 75 at locations of record.</p> <p>Tuart Woodland TEC</p> <p>One Tuart was recorded immediately adjacent to the clearing extent. The area surrounding the Tuart was assessed for the presence of further Tuarts and vegetation condition. A total of 8 Tuarts in close proximity were identified. The vegetation was assessed to be in Good condition. The patch of Tuarts is considered to be Tuart Woodland TEC in consistence with the Approved Conservation Advice by the Department of the Environment and Energy (DoEE, 2019). Further details are discussed below.</p> <p>A portion of VT03 intersects with the mapped TEC. The portion is therefore considered to be part of the TEC.</p> |
| Vegetation condition   | Degraded, Good condition of VT03 outside clearing extent   |
| Weed percentage cover  | 25-75%%  |
| Disturbance  | Historic clearing, fire regimes and weeds.   |
| Wetland mapped   | No   |
| Is vegetation indicative of wetland vegetation?  | No   |
| Does the condition align with MU/RE/CCW?   | N/A  |
| Black cockatoo foraging habitat  | Yes  |
| Black cockatoo roosting habitat  | No   |
| Black cockatoo breeding habitat  | No   |
| Fauna evidence   | No   |
| Site Photos  | See Appendix A   |
| General Comments   |  |
| <p>The entire Tamala Park Site is located within Bush Forever Site No. 383 and mapped as Environmentally Sensitive Area (ESA).</p> <p>The following vegetation types have been found within the survey area:</p> <p><u>Vegetation intersecting with the clearing extent:</u></p> <p>The vegetation immediately west of the bike path appears to be a mixture of landscaping/revegetation in a Degraded condition. The vegetation present is not representative of the vegetation naturally occurring in adjacent areas outside the survey area. The vegetation within the clearing extent has been historically cleared and landscaped with the construction of Mitchell Freeway and the bike path.</p> <p>VT01 – Acacia shrubland</p> <p><i>Acacia rostellifera</i>, <i>Chamelaucium uncinatum</i> and <i>Melaleuca huegelii</i> over native and non-native shrubs. The ground stratum is covered by weeds.</p> <p>Degraded condition</p> <p>0.30 ha of VT01 intersects with the clearing extent.</p> |  |





## Site Inspection Form

### VT02 – Open shrubland

Dominated by *Chamelaucium uncinatum* over weedy understorey. Scattered *Banksia sessilis*.

Degraded condition

0.05 ha of VT02 intersects with the clearing extent.

A total of 2 scattered *Banksia sessilis* were recorded within the clearing extent.

### Outside of the clearing extent, west of the unsealed footpath:

### VT03 – Acacia and *Banksia sessilis* Woodland

Dominated by *Acacia* spp. *Banksia sessilis*, *Allocasuarina fraseriana* and *Nuytsia floribunda* with scattered *Banksia menziesii* and *Banksia attenuata*, over *Macrozamia fraseri* and native forbs.

### Threatened and Priority Flora Species

The Priority 1 species *Baeckea* sp. Limestone (P1, as listed by DBCA) was recorded along the edge of the Banksia Woodland (VT03), outside of the clearing extent. Nine populations were recorded in total, as displayed in Figure 2. Impacts have been avoided.

### Threatened and Priority Ecological Communities (TEC/PEC)

One Tuart has been recorded within the northern portion of the survey area within VT03 (Figure 2).

The area surrounding the Tuart has been assessed for the occurrence of other Tuart trees outside the survey area to confirm the potential for the Tuart to be part of a patch of Tuart Woodlands TEC. Seven other Tuarts were recorded within close proximity. Aerial imagery indicates the presence of further Tuart trees in the surrounding area. All trees were less than 60 m apart from each other. In accordance with the 2019 Approved Conservation Advice by the Department of the Environment and Energy (DoEE), a patch with a size of 2 ha or above is considered Tuart Woodlands TEC if its condition is at least "Moderate". "Moderate" condition is defined as either "≥50 % of all understorey vegetation cover is native" or "at least 4 native understorey species per 0.01 ha (10 m x 10 m plot or equivalent sample unit)" (DoEE, 2019). As the mapped area of Tuart Woodland was assessed as being > 2 ha, the vegetation is identified as meeting the diagnostic criteria for the Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain.

The portion of VT03, which intersects with the mapped intersecting 30 m buffers around Tuarts, is therefore considered to be Tuart Woodland TEC. The site design was amended to avoid impacts to VT03 and any Tuart trees.

It is recognised that VT01 intersects with the mapped Tuart Woodland TEC buffer. The vegetation is however entirely different in regard to species composition and richness compared to VT03, the vegetation type containing the Tuarts. VT01 is therefore not considered representative of Tuart Woodland TEC and is not part of the TEC patch.

### Black Cockatoo Habitat Values

The two recorded *Banksia sessilis* located within the clearing extent have high foraging value for Carnaby's black cockatoo (*Zanda latirostris*).

The Tuart tree had a DBH < 500 mm and is therefore not a potential breeding tree. It has moderate foraging value for Forest red-tailed black cockatoo (*Calyptrorhynchus banksii*). The Tuart is located outside the clearing extent. Impacts will be avoided.

Vegetation and clearing footprint mapping are presented in Figure 2.





Figure 2: Biological Assessment – Site #84 Tamala Park

| <div><div><div></div><div>0</div><div>9</div><div>18</div><div>27</div><div>36 m</div></div><div>N</div></div> |                | PROJECT/REPORT NAME<br>Environmental Site Assessment<br>Site #51 Lake Walyungup |          | <div>Legend</div> <div><div><div></div><div></div></div><div>Survey Area</div></div> <div><div><div></div><div></div></div><div>Clearing Footprint</div></div> <div><div><div></div><div></div></div><div>Banksia sessilis</div></div> <div><div><div></div><div></div></div><div>One-leaf Cape tulip<br/>(*Morea flaccida) –<br/>Declared Pest</div></div> <div><div><div></div><div></div></div><div>Baeckea sp. Limestone<br/>(N. Gibson&amp; M.N.<br/>Lyons 1425) - Priority 1</div></div> <div><div><div></div><div></div></div><div>Commonwealth TEC<br/>Tuart Woodlands and<br/>Forests (as per DSEWPac 2018)</div></div> <div>Vegetation Type</div> <div><div><div></div><div></div></div><div>VT01 - Acacia shrubland</div></div> <div><div><div></div><div></div></div><div>VT02 - Geraldton wax open shrubland</div></div> <div><div><div></div><div></div></div><div>VT03 - Acacia and Banksia sessilis Woodland</div></div> <div><div><div></div><div></div></div><div>Tuart Woodland TEC</div></div> |  | <table><tr><th>No</th><th>Description</th><th>Drawn</th><th>Approved</th><th>Date</th></tr><tr><td>A</td><td>Original Issue</td><td>JP</td><td>JB</td><td>21/1/2025</td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table> |  | No | Description | Drawn | Approved | Date | A | Original Issue | JP | JB | 21/1/2025 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| No   | Description    | Drawn   | Approved |  |  | Date  |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| SCALE<br>1:1,000   |                | SHEET SIZE<br>A3 COLOUR   |          | CLIENT<br>UGL Engineering Pty Limited  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| COORDINATE REFERENCE SYSTEM<br>GDA2020 / MGA zone 50   |                | PROJECT NUMBER<br>P22.100A  |          | VERSION<br>0   |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| DATA SOURCE<br>LANDGATE AERIAL IMAGERY Summer 2023   |                | DRAWN BY / REVIEWED BY<br>JP/JB   |          | DATE<br>21/1/2025  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          | NOTES:<br>Cadastral boundary (LGATE-002). Label<br>corresponds to the vegetation association number.   |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |                |   |          |  |  |   |  |    |             |       |          |      |   |                |    |    |           |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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Figure 3: Vegetation Condition – Site #84 Tamala Park

|   |  |   |  |                                       |  |                    |  |                      |  |  |  |
|---|--|---|--|---------------------------------------|--|--------------------|--|----------------------|--|--|--|
| <div><div>07142128</div><div>N</div></div> <div>SCALE<br/>1:800</div> |  | PROJECT/REPORT NAME<br>Environmental Site Assessment<br>Site #51 Lake Walyungup |  | CLIENT<br>UGL Engineering Pty Limited |  | Legend             |  | Vegetation Condition |  | No Description Drawn Approved Date<br>A Original issue JP JB 21/1/2025   |  |
| SHEET SIZE<br>A3 COLOUR   |  | PROJECT NUMBER<br>P22.100A  |  | VERSION<br>0                          |  | Survey Area        |  | Good                 |  |  |  |
| COORDINATE REFERENCE SYSTEM<br>GDA2020 / MGA zone 50                  |  | DRAWN BY / REVIEWED BY<br>JP/JB   |  | DATE<br>21/1/2025                     |  | Clearing Footprint |  | Completely Degraded  |  |  |  |
| DATA SOURCE<br>LANDGATE AERIAL IMAGERY Summer 2023                    |  |   |  |                                       |  |                    |  | Degraded             |  | NOTES:<br>Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.  |  |
|   |  |   |  |                                       |  |                    |  |                      |  | <div><div></div><div>WESTERN ENVIRONMENTAL</div><div>Western Environmental Pty Ltd<br/>08 6244 2310   enquiries@westernv.com.au<br/>Level 3/25 Prowse St, West Perth WA 6005<br/>westernv.com.au</div></div> |  |



## Summary of Residual Clearing Impact and Significance Assessment

A summary of the clearing necessitated by the Project is presented in Table 3. The impact significance was assessed to comply with the EPBC Act *Significant impact guidelines 1.1 – Matters of National Environmental Significance* (DoE, 2013) (Significant Impact Guidelines 1.1).

Table 3: Clearing Impact for Tamala Park

| Site                    | Impacted Vegetation - Description  | Clearing Impact (ha) | Significance Assessment under the EPBC Act |
|-------------------------|--|----------------------|--|
| Site #84<br>Tamala Park | <ul style="list-style-type: none"> <li>The project necessitates clearing of 0.35 ha of native vegetation under the EP Act.</li> <li>Remnant native vegetation to be cleared is in Good to Completely Degraded condition.</li> <li>Tuart Woodland and Forests of the Swan Coastal Plain TEC has been found present in VT03, adjacent to the clearing extent. The site design was amended to avoid impacts to the TEC.</li> <li>No Priority Flora will be impacted.</li> <li>The vegetation has low habitat value for Threatened Black cockatoo species. Two isolated <i>Banksia sessilis</i> with high foraging value for Carnaby's black cockatoo are proposed to be cleared. The site design was amended to avoid any impacts to Tuarts, which provide moderate foraging value for Forest red-tailed black cockatoo.</li> <li>The Site is located within the mapped Bush Forever Site No. 383, which represents an Environmentally Sensitive Area (ESA). An NVCP will therefore be required.</li> </ul> | 0.35 ha              | Not significant                            |

## Significance Assessment based on Current Design

After the presence of Tuart Woodland TEC was identified in the area of the Site, the site design was changed to avoid impacts to Tuarts and vegetation considered to be part of the Tuart Woodland TEC patch.

VT01 does not meet the condition criteria, has been historically cleared and is comprised by planted and regrown vegetation. The mapped TEC buffer intersecting with VT01 is therefore not considered part of the Tuart Woodland TEC patch. Therefore, no impacts to Tuart Woodlands TEC are expected.

The clearing of two individual *Banksia sessilis* is not considered a significant impact to Carnaby's or Forest red-tailed black cockatoo.





## Conclusions

Based on review of publicly available data and biological assessment of the Site, the following key findings have been identified:

- The following two vegetation types have been identified within the survey buffer area:
  - VT01: Acacia shrubland - Revegetation and potentially natural recruitment species mix of native shrubs (*Acacia* spp, *Melaleuca* spp.) over weedy understory. The vegetation is in Degraded to Completely Degraded condition. This vegetation type intersects with the clearing extent. The project necessitates clearing of 0.30 ha of this vegetation type.
  - VT02: Geraldton wax open shrubland over weedy understory. The vegetation is in Degraded to Completely Degraded condition. The project necessitates clearing of 0.05 ha of this vegetation type.
  - VT03: Acacia and *Banksia sessilis* woodland – Dominated by *Acacia* spp., *Allocasuarina fraseriana* and *Banksia sessilis* with *Nuytsia floribunda*, scattered *Banksia* spp. and *Eucalyptus gomphocephala* over native shrubs and forbs, including *Baeckea* sp. Limestone (P1). This vegetation type is associated with Tuart Woodlands TEC (see below) and will not be impacted
- A total of 0.35 ha of native vegetation will be cleared (0.30 ha of VT01 and 0.05 ha of VT02).
- A patch of Tuarts has been identified in the north-west of the Site. The area was assessed to be in “Moderate” condition as defined in the *Approved Conservation Advice for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community* (DoEE, 2019). Since the total area of Tuart Woodland was assessed to be > 2 ha, the vegetation associated with VT03 is identified as meeting the diagnostic criteria for the Tuart Woodlands TEC. Other vegetation types, which intersect with the mapped buffer around individual Tuart trees, do not meet the condition criteria and are planted and regrown vegetation. These vegetation types are therefore not considered to be Tuart Woodland TEC.
- Nine populations of Priority 1 species *Baeckea* sp. Limestone have been recorded within the buffer area in VT03, outside the clearing extent.
- The Site is located within Bush Forever Site No. 383 and mapped as ESA.

Based on the findings of the flora and vegetation assessment Site #84 – Tamala Park, the Project necessitates clearing of 0.35 ha of native vegetation at the Site. The following environmental approvals will be required:

- A Native Vegetation Clearing Permit.

Given that impacts to Tuart Woodland TEC will be avoided, no EPBC referral will be required, and the clearing activity is not considered to require environmental offsets.





This report should be read in conjunction with the Schedule - Statement of Limitations. Should you have any queries regarding the above, please contact the undersigned on (08) 6162 8980.

Yours sincerely,

Western Environmental Approvals Pty Ltd



Director

Schedule

- Statement of Limitation

Appendices

- Appendix A: Site Photos
- Appendix B: Species List



## **Statement of Limitations**

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### **Environmental Conclusions**

In accordance with the scope of services, WEPL has conducted environmental field monitoring and/or testing in the preparation of this report. The nature and extent of monitoring and/or testing conducted is described in this report.

On all sites, varying degrees of non-uniformity of vertical and horizontal conditions in media (soil, water, air, waste or other media as described in the report) are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of media conditions encountered. The conclusions are based on the data and the environmental field monitoring and/or testing actually undertaken, and are therefore merely indicative of the environmental condition of the site at the time of preparing this report, including the presence or otherwise of contaminants or emissions. It should be recognised that site conditions, including the extent and concentration of contaminants, can change.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. To the maximum extent permitted by law, no other warranty, express or implied, is made.

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WEPL will not be liable to update or revise this report to take into account any events or circumstances or facts becoming apparent after the date of this report.





## References

Department of the Environment (DoE). (2013). *Significant impact guidelines 1.1 – Matters of National Environmental Significance*. Accessed on 12 November 2024 from [https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines\\_1.pdf](https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf)

Department of the Environment and Energy (DoEE). (2019). *Approved Conservation Advice (incorporating listing advice) for the Tuart (Eucalyptus gomphocephala) woodlands and forests of the Swan Coastal Plain ecological community*. Retrieved on 12 November 2024 from: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/153-conservation-advice.pdf>.

Metronet. (2023). *High Capacity Signalling: Radio Systems Replacement Fact Sheet*. Retrieved on 12 November 2024 from <https://metronet.wa.gov.au/Portals/31/Project%20Documents/High%20Capacity%20Signalling/Radio%20Systems%20Replacement%20Fact%20Sheet.pdf>.





# Appendix A

## **Site Photos**







**Photo 1**

Date: 18 October 2024

**Description:** Vegetation within VT01 Acacia shrubland, within clearing extent, west of cycle path, Degraded



**Photo 2**

Date: 18 October 2024

**Description:** Vegetation within VT01 Acacia shrubland, within clearing extent, west of cycle path, Degraded







Photo 3

Date: 18 October 2024

**Description:** Vegetation within VT02, Acacia shrubland, Degraded



Photo 4

Date: 18 October 2024

**Description:** Vegetation within VT02, Acacia shrubland, Degraded







**Photo 4**

**Date:** 18 October 2024

**Description:** Vegetation within VT02, Acacia shrubland, Degraded





## Appendix B

# Species List





| Species                           | Stratum |
|-----------------------------------|---------|
| <i>Melaleuca huegelii</i>         | Mid     |
| <i>Melaleuca systema</i>          | Mid     |
| <i>Acacia saligna</i>             | Mid     |
| <i>Acacia rostellifera</i>        | Mid     |
| <i>Acacia cochlearis</i>          | Mid     |
| <i>Grevillea preissii</i>         | Mid     |
| <i>Grevillea vestita</i>          | Mid     |
| <i>Hakea trifurcata</i>           | Mid     |
| <i>Daviesia triflora</i>          | Mid     |
| <i>Jacksonia sternbergiana</i>    | Mid     |
| <i>Banksia sessilis</i>           | Mid     |
| <i>Banksia menziesii</i>          | Mid     |
| <i>Allocasuarina fraseriana</i>   | Mid     |
| <i>*Chamelaucium uncinatum</i>    | Mid     |
| <i>*Acacia hilliana</i>           | Mid     |
| <i>Scaevola nitida</i>            | Ground  |
| <i>Eremophila glabra</i>          | Ground  |
| <i>Pelargonium capitatum</i>      | Ground  |
| <i>Asphodelus fistulosus</i>      | Ground  |
| <i>Olearia axillaris</i>          | Ground  |
| <i>Templetonia retusa</i>         | Ground  |
| <i>Hibbertia hypericoides</i>     | Ground  |
| <i>Macrozamia fraseri</i>         | Ground  |
| <i>Baeckea</i> sp. Limestone (P1) | Ground  |
| <i>*Euphorbia terracina</i>       | Ground  |
| <i>*Aerva javanica</i>            | Ground  |
| <i>*Bidens subalternans</i>       | Ground  |
| <i>*Flaveria trinervia</i>        | Ground  |
| <i>*Boerhavia coccinea</i>        | Ground  |
| <i>*Cenchrus ciliaris</i>         | Ground  |
| <i>*Cenchrus setigerus</i>        | Ground  |
| <i>*Phyllostachys aurea</i>       | Ground  |
| <i>*Portulaca oleracea</i>        | Ground  |
| <i>*Sonchus oleraceus</i>         | Ground  |
| <i>*Solanum lasiophyllum</i>      | Ground  |

