# Appendix D to Attachment 1 to Item 4.5.2.

Appendix D – Tech Memo 3

Date of meeting: 12 March 2024
Location: Council Chambers
Time: 6:30 p.m.

Member of the Surbana Jurong Group

# Technical Memorandum

| | | | |
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| **Memo No.** | 03 - Collections | **Date of Issue** | 31 May 2023 |
| **Subject** | Collection Services | **Discipline** | Waste and Resource Recovery |
| **Project Title** | Hawkesbury Landfill Management Strategy Beyond 2026 | **Project No.** | \\filer.nasuni.local\smecanz\Projects\300191\30019111 - HCC Landfill Management Strategy\200 Project Working Folder (Detailed Design) |
| **Document No.** | Tech Memo – 03 - Collection Analysis | **Revision** | 05 |
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| **Prepared for** | Hawkesbury City Council | **Attention to** | Samuel Swain |
| **Attachments** | Appendix 1: Detailed breakdown of bins collected per suburb<br>Appendix 2: OptimoRoute maps | | |

## 1. Purpose and Approach

The purpose of this Technical Memo (Memo) is to present a summary of data and findings for the assessment conducted on the collection services provided by Hawkesbury City Council (HCC) including options for disposing of collected waste at an alternative disposal site should the current landfill close. HCC has supplied a range of documents (see Section 2) that have been reviewed as part of the development of this Memo. More specifically, this Memo addresses the following:

- Analysis of the cost efficiency of the current red bin collections to identify efficiencies within the MSW kerbside collection system and the impact of any changes to site operations.
- The potential for increased recovery via collection services and implications of this for the life of the landfill, economic viability of activities and ability to expand the customer base to other LGAs.

In undertaking the above assessments, SMEC has endeavored to answer the following questions:

- Can there be efficiency gains in the current collection process?
- Could a contractor provide better value for money in collections of the waste?
- Does the current collection truck fleet have the capacity to transport waste to an alternate disposal location?
- What efficiencies could be gained using a transfer station at the current site (HWMF) for accepting waste from collection vehicles?
- Are there any other feasible improvements that could be implemented for the current collection service?

The works undertaken in the assessment of the collection services included:

- Identifying the total number of bins by consulting bin collection schedules, collection day zoning maps and list of registered addresses for bin collection.

- Corroborating the number of shifts completed by staff by comparing timesheets and vehicle activity reports for a sample month of collection (November 2022).
- Comparing the efficiency of collection routes utilised by staff with an optimised route produced by a route planning program called OptimoRoute[1].
- Review potential impact on current and future collection, when, and if FOGO is introduced.
- Identify options for HCC on how to proceed with its red lid collection service in the future and calculate approximate high-level indicative costs for the different options.

The information retrieved from the above data sources along with general advice from Council project team and an interview with the waste collection supervisor has been reviewed and assessed, to better understand the **current situation of collections in the HCC collection area**, analyse the **efficiency of HCC operated day labour** for collection and explore **alternative options for waste collection**.

In addition to the above, additional data discussed in this report relating to resource recovery and growth data has been obtained from a separate technical memorandum addressing Resource Recovery options.

## 1.1 List of HCC-supplied documents reviewed:

- Att - 1 Collection Day Zones - Suburb and Street – Shortcut
- Att - 2 Collection Day Zones - Suburb Level – Shortcut
- Att - 4 Waste-Service-Directory – Shortcut
- Att - 7 Waste Services 2021-2022 - Individual Property Data
- Bin Collection Days
- Current Collection routes
- Garbage Service Directory - Bin Nights
- Activity Reports for vehicle numbers 130, 132, 133, 134 (1-11-22 to 30-11-22)
- Employee Timesheets and Plant for November 2022
- Interview with Waste Supervisor on the 14th of April 2023

# 2. Summary of Findings

## 2.1 Assessment of Existing HCC Collection Service

SMEC has reviewed the current collection system for the red lid bins to determine how well-utilised the current in-house collection fleet is, and if there is room for improved efficiency and growth of service numbers.

### 2.1.1 Total Number of Red Lid Bins

HCC's collection service consists primarily of weekly residual waste services (red lid bins) and a relatively small number of fortnightly collection services. The residual waste bin service is provided by HCC staff and recycling and organics collection services are contracted to JJ Richards. The HCC Kerbside Collection Area consists of **24,724 registered bins** for collection. Table 1 below details the different bin types and number of bins in each category. The bin type determines the waste stream, volume, and collection frequency. This review focuses on the efficiency of red lid bin collections.

***Table 1: Bin Categories and Number of Bins***

| Bin Type | No. of Services | No. of Pickups per Week |
|---|---|---|
| Business Charge - Weekly 140L Red Bin and Fortnightly 240L Recycling Bin | 147 | 147 |

[1] https://optimoroute.com/?gclid=ed1289090b2b138b7979ed50b45a664d&gclsrc=3p.ds&&/?utm_or_cid=270304122&utm_or_agid=1152288221615550&utm_or_fiid=&utm_or_tid=kwd-72018774502514:loc-9&utm_or_loc=123845&utm_or_mt=p&utm_or_n=o&utm_or_crid=&utm_or_kw=optimal%20routes&utm_or_pl=&utm_or_tgt=&utm_or_pos=&utm_or_qs=what%20is%20optimoroute&msclkid=ed1289090b2b138b7979ed50b45a664d&utm_source=bing&utm_medium=cpc&utm_campaign=OR%20-%20Australia%20%26%20NZ&utm_term=optimal%20routes&utm_content=Route%20Planning

| | | |
|---|---|---|
| Business Charge - Weekly 240L Red Bin and Fortnightly 240L Recycling Bin | 884 | 884 |
| Residential - Weekly 140L Red Bin and Fortnightly 240L Recycling Bin | 3,286 | 3,286 |
| Residential - Weekly 140L Red Bin, Fortnightly 240L Recycling Bin, and Fortnightly 240L Garden Organics Bin | 4,533 | 4,533 |
| Residential - Weekly 240L Red Bin and Fortnightly 240L Recycling Bin | 5,873 | 5,873 |
| Residential - Weekly 240L Red Bin, Fortnightly 240L Recycling Bin, and Fortnightly 240L Garden Organics Bin | 9,458 | 9,458 |
| **Fortnightly Red bin services (i.e., bins only collected alternative weeks)** | | |
| Residential - Fortnightly Services - 140L Red Bin and 240L Recycling Bin | 71 | 36 |
| Residential - Fortnightly 240L Red Bin and Fortnightly 240L Recycling Bin | 472 | 236 |
| **Total** | **24,724** | **24,453** |

### 2.1.2 Collection Schedule for Residual Waste Bins

The current collection services undertaken by HCC are performed with the aid of physical maps and the local route knowledge of the collection area by the drivers (i.e. no property order list or software system map are used.

SMEC has therefore undertaken an assessment of the **collection addresses** against the **collection maps** (Figure 1) that indicate "Rubbish & Recycling Areas" by "collection day" and the **Garbage Service Directory**, to identify additional suburbs that were not captured in the original schedule.

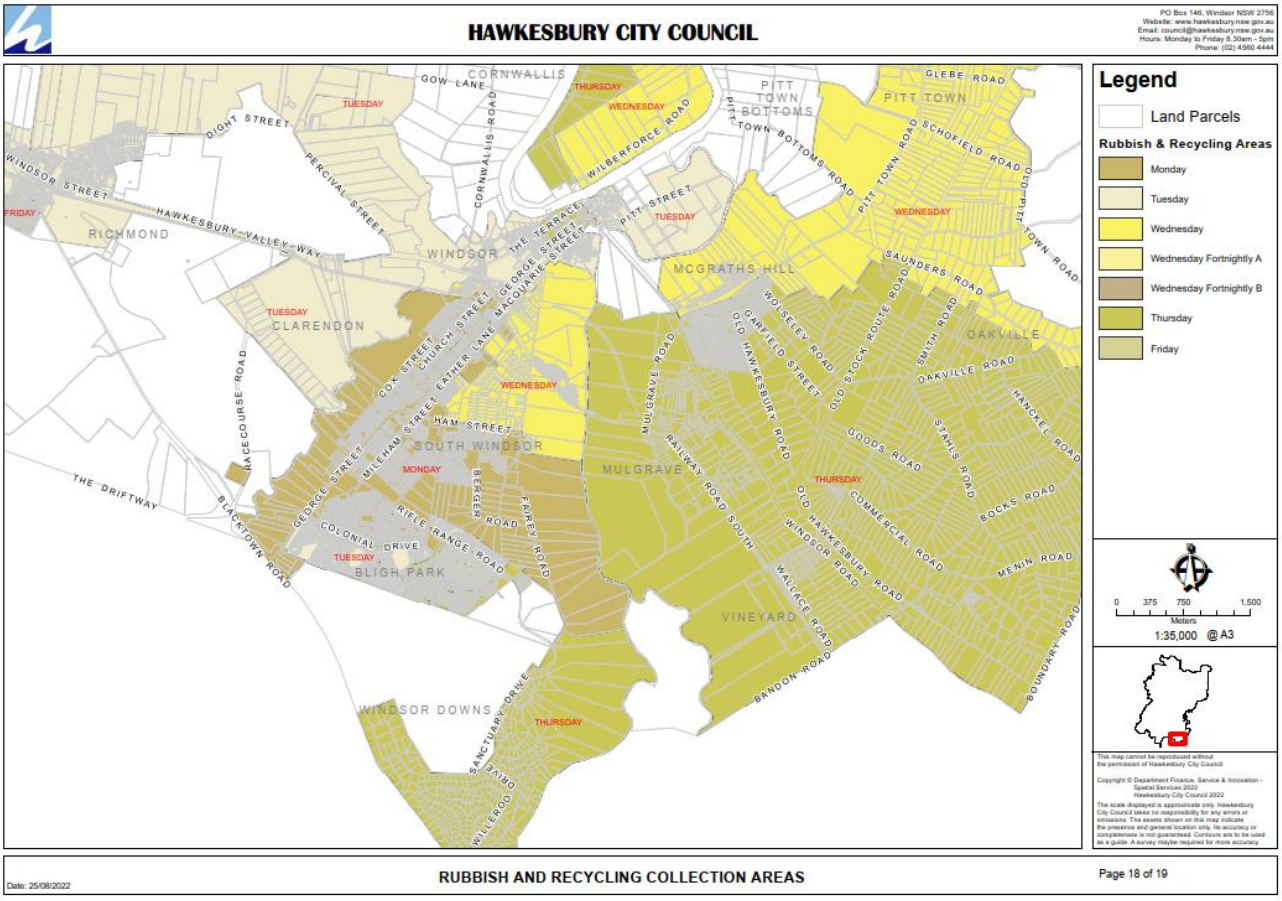



*Figure 1:* ***Example Collection Map from 'Att - 2 Collection Day Zones - Suburb Level'***

The table below indicates the number of suburbs and the number of bins scheduled to be collected on each collection day.

SMEC has assumed an average of 500 bins per load following the advice of the depot waste supervisor who estimated that each load carries between 400 to 600 bins depending on the season (e.g. peak season volumes) and weather. It

should be noted that a detailed review of the waste collection data was not able to verify an average number of bins collected per vehicle. As a result, we have used an average of 500 bins to estimate approximate loads per week. It should also be noted that each load could carry a lesser number of bins if it would increase the efficiency of a route for collection, at the discretion of the driver.

*Table 2: Summary of the number of loads per collection day*

| Collection day | No of suburbs | No of collections | No of shifts used per day | No of vehicles used | Number of loads required if 500 bins per load |
|---|---|---|---|---|---|
| Monday | 13 | 5014 | 6-8 | 4 | 10 loads |
| Tuesday | 10 | 5533 | 6-9 | 3 – 4 | 12 loads |
| Wednesday | 15 | 4316 | 5-8 | 3-4 | 10-11 loads |
| Wednesday fortnightly A | 4 | 118 | Included above | Included above | Included above |
| Wednesday fortnightly B | 10 | 414 | Included above | Included above | Included above |
| Thursday | 18 | 4657 | 6 to 9 | 4 | 9 loads |
| Friday | 13 | 4672 | 6 to 9 | 3-4 | 9 loads |

It should be noted that Bligh Park, Windsor, Kurrajong and North Richmond have multiple collection days in the collection maps and street register, which is not reflected in the original bin collection schedule supplied to SMEC by HCC.

Table 3 below details the number of bins and collection days for these four suburbs and how they have been allocated per collection day (the allocation is based on how many streets are allocated to each suburb per day in the Waste Service Register). The estimated collection days have also been confirmed based on vehicle movement observed in the **activity reports** for the month of November 2022.

*Table 3: Collection Summary for Bligh Park, Kurrajong, North Richmond, and Windsor*

| Suburb | Total number of Bins | Number of collections by weekday | | | | |
|---|---|---|---|---|---|---|
| | | Mon | Tue | Wed | Thu | Fri |
| North Richmond | 2298 | 156 | 2115 | 0 | 0 | 27 |
| Windsor | 944 | 38 | 622 | 246 | 19 | 19 |
| Bligh Park | 2,303 | 694 | 625 | 312 | 672 | 0 |
| Kurrajong | 1,081 | 274 | 0 | 0 | 533 | 274 |

Further details on the collection day for individual suburbs, including information on additional suburbs that were not listed in the original schedule, please refer to Appendix 1:  Detailed breakdown of bins collected per suburb.

### 2.1.3 Utilisation of HCC Day Labour for Collection of Residual Waste Bins

HCC employs between 5 to 8 staff per day, including a waste supervisor and leading hand. Each employee is paid for 7.6-hour shifts. To assess the efficiency of the collection service in terms of labour costs, the following time sheets were reviewed:

- Week 1 (4 days) (1/11/22 – 4/11/22)
- Week 2 (5 days) (7/11/22 – 11/11/22)
- Week 3 (5 days) (14/11/22 – 18/11/22)
- Week 4 (5 days) (21/11/22 – 25/11/22)
- Week 5 (2 days) (28/11/22, 29/11/22)

, SMEC has reviewed the activity report for a month to check start time, break time and finish time for each vehicle and compared this to time sheet hours.

For this exercise, SMEC has assumed, that one 7.6-hour shift is inclusive of approximately two 15-minute intervals to check in and check out of the collection vehicle and perform admin tasks such as vehicle checks, refuelling, timesheets, resourcing before starting and ending its working day (referred to as check-in/checkout time).

Table 4 below summarises collection data from timesheets and activity reports. The number of shifts (7.6 h) for drivers and vehicles varies for the different collection days. The hours reported on the timesheets and the hours inferred from the activity reports were utilised to identify the average number of hours the collection employees are not utilised (but paid for by Council). This difference between Council paid hours and the actual collection hours is presented under the column labelled 'Room for growth'.

The number of shifts (7.6 h) for drivers and vehicles varies for the different collection days. **The referenced plant number 135 is assumed to be a non-collection vehicle and its shifts are therefore not included in the table below as it does not form part of the collections.**

It should be noted that the analysis given below is based on the data provided for this particular month, it is not inclusive of additional time for break-down, daily maintenance and other variances such as having an ordinary driver replaced with a temporary driver on the route. Additionally, there are no observable breaks taken by the drivers during their shift, therefore it has been excluded from working hours.

***Table 4: November 2022 Summary by weeks of collection***

| Collection Week (Activity Report & Timesheet) | Planned Shifts (Timesheet) | Average Shifts (Activity Report) | Planned working hours (Timesheet) | Average working hours (Activity Reports) | Room for growth (h) | Salary paid by HCC for Labour (Timesheet) | Salary of Labour based on the actual working hour (Activity Report) |
|---|---|---|---|---|---|---|---|
| Week 1 (4 days) | 19 | 21 | 144.4 | 146.8 | -2.4 | $4,552.40 | $4,550.2 |
| Week 2 (5 days) | 35 | 35 | 266 | 199.8 | 66.277 | $8,352.40 | $6,193.8 |
| Week 3 (5 days) | 36 | 35 | 273.6 | 232 | 41.634 | $8,572.80 | $7,192.6 |
| Week 4 (5 days) | 36 | 35 | 273.6 | 223 | 50.690 | $8,588.00 | $6,913.9 |
| Week 5 (2 days) | 14 | 14 | 106.4 | 87.6 | 19.73 | $3,298.40 | $2,716.8 |
| TOTAL | 140 | 140 | 1,064 | 889.3 | 164.7 | $33,364.00 | $27,567.4 |

The data in Table 4 suggests that there could be up to 164.7 h unutilised per month. This equates to 2,009 h per year. It should be noted that this number is based on activity report data and there may be additional working hours embedded that SMEC has been unable to identify. The data is also just representative of one month and there may be variations throughout the year.

To further visualise working hours verse timesheet hours, a graph has been prepared in Figure 2. See below. Figure 2 presents the average working time per shift (including 0.5h break time and 0.5 hr check-in/out time) against the expected 7.6-hour shifts. The number of shifts per driver was concluded from the entries in the November time sheets whereas the driving time was extracted from the GPS data on the activity reports.

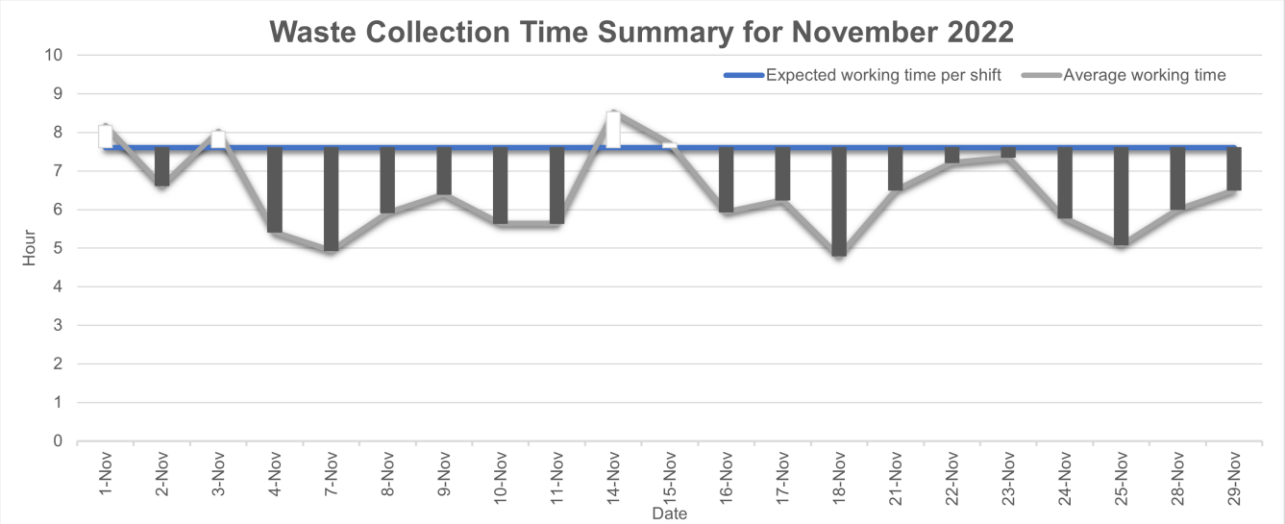



*Figure 2:* ***Expected and Average Driving Time per Shift***

The graph above indicates that the working hours vary from week to week. To ascertain if and which days are under or over-utilised, a further breakdown of the individual collection days was undertaken, and the result is represented in Table 4. Table 4, again uses and displays information from the Activity Reports and Timesheets for the month of November in 2022.

***Table 5: November 2022 Summary by Working Days***

| Nov | Average Shifts (Activity Report) | Planned Shifts (Timesheet) | Average working hours (Activity Reports) | Planned working hours (Timesheet) | Salary of Labour based on the actual working hour (Activity Report) | Salary paid by HCC for Labour (Timesheet) |
|---|---|---|---|---|---|---|
| Mon | 6.5 | 6.5 | 41.7 | 49.4 | $1,293 | $1,531 |
| Tue | **7.0** | **6.8** | **49.7** | 51.68 | $1,541 | $1,602 |
| Wed | 6.5 | 6.25 | 42.8 | 47.5 | $1,327 | $1,473 |
| Thu | 6.5 | 6.75 | 40.4 | 51.3 | $1,252 | $1,590 |
| Fri | 6.8 | **7** | 35.3 | **53.2** | $1,094 | $1,649 |
| **Average (per day)** | **6.7** | **6.7** | **42.0** | **50.6** | **$1,302** | **$1,567** |
| **Annual** | **1742** | **1742** | **10,920** | **13,156** | **$338,520** | **$407,420** |

The table above indicates that Tuesday is the heaviest working day, followed in order by Wednesday, Monday, Thursday and Friday. Most room for growth appears to be on Fridays. If the numbers above are representative, then HCC has, on average, time that equates to approximately 2 shifts per week that potentially is underutilised. This underutilised time equates to a monetary value of $69,000 per annum.

### Discrepancies in data

The following discrepancies were identified during the assessment of the vehicle activity for the month of November 2022 and have not been able to be resolved. The impact on the data has been described in the table below.

***Table 6: Discrepancies and how it was solved***

| Date | | Impact on data |
|---|---|---|
| 1 Nov | Extra one shift found from Vehicle no 134, which was not in the timesheet | One extra shift added |
| 2 Nov | Missing activities record for Vehicle no 133, Vehicle no. 131 and 132 was used but was not recorded in the timesheets (2 shifts) | One extra shift added |

| Date | | Impact on data |
|---|---|---|
| 3 Nov | Vehicle no. 131 was not used but was noted in the timesheet. Vehicle no 132 was used according to the activity report but not reported in timesheet. | Vehicle no. 132 was used instead of 133. Incorrect reporting of vehicle no. could lead to over-use or under-use of some vehicles<br>There are still one shift missing, no additional record found from any other vehicle |
| 4 Nov | One shift Vehicle number is missing in the timesheet. Vehicle no .131 and 132 not recorded in the time sheets but was active according to the activity report. Assumed one shift replaced the missing number. | Assumed one shift replaced the missing number.<br>One extra shift added |
| 7 Nov | Vehicle no. 133 not in activity report, Vehicle no. 132 not in timesheet | Used data for vehicle 132 to replace 133.<br>Incorrect reporting of vehicle no. could lead to over-use or under-use of some vehicles |
| 8 Nov | Missing record of Vehicle no. 133 not in activity report (1 shift) | Assume working hour is 7.6 h for that shift |
| 11 Nov | Record found for Vehicle no. 131, assumed it is the missing truck number in timesheet number (2 shifts) | No impact |
| 14 Nov | Missing record of Vehicle no. 131 not in activity report (2 shifts) | Assume working hour is 7.6 h for each shift that day |
| 18 Nov | Two shifts Vehicle number are missing in the timesheet. Record found for Vehicle no. 132 and 134, assumed they are the missing truck number in timesheet number (2 shifts) | There are still one shift missing, no additional record found from other vehicle. No Impact. |
| 21 Nov | One shift Vehicle number is missing in the timesheet. Record found for Vehicle no. 132, assumed it is the missing truck number in timesheet number. | No impact |
| 22 Nov | One shift Vehicle number is missing in the timesheet. Record found for Vehicle no. 132, assumed it is the missing truck number in timesheet number. | No impact |
| 23 Nov | One shift Vehicle number is missing in the timesheet. Record found for Vehicle no. 132, assumed it is the missing truck number in timesheet number. | No impact |
| 24 Nov | One shift Vehicle number is missing in the timesheet. Record found for Vehicle no. 130, assumed it is the missing truck number in timesheet number. | No impact |
| 25 Nov | Three shifts Vehicle number are missing in the timesheet. Record found for Vehicle no. 131 and 133, assumed they are the missing truck number in timesheet number (2 shifts) | There are still one shift missing, no additional record found from other vehicle. No impact. |
| 30 Nov | No data available for vehicles | Total working days reduced to 21 days |

Additional observations were as follows:

- Lunch breaks cannot be identified in the activity report and it appears that each shift is undertaken without a break/ imperceptible short break. Vehicles remain idle for 30 min to 2h at the depot before the next shift starts.
- The breaks at the depot were also of different lengths, this may be due to the impact of vehicle maintenance and/or other unknown reasons.
- The average start time for all shifts was between 3:00 am and 4.00 am with a finish time of around 8-9:00 am. Late starts were observed on the 2nd, 7th, 9th, 16th, 21st, 23rd,24th, and 25th November. It was also noted that collections started as early as 2.30am.

  The second shift usually started between 9:00 am and 9:30 am and finished between 12:30 pm to 2:00 pm.
- Special night shifts were observed on 1 Nov (Truck 143), and 15 Nov (Truck 130 and 131). The special night shift worked between 10 pm and 4:30 am.
- On average, each vehicle went to the landfill at least 2 times per day, with the majority of days being 3 times per day. On the rare occasion, a vehicle only visited the landfill once.

- The 1st Nov 2022 (Monday) was the longest collection day and 25th November 2022 (Friday) was the least busy day.

Based on this, and being aware of the discrepancies mentioned above, it still looks like HCC is paying for more hours than it is utilising. This indicates that overall, there may be room for growth under the current operation.

### 2.1.4 Route Optimisation for Collection

SMEC conducted three software route optimisations in OptimoRoute, using the data from the activity reports to determine what would be an optimised collection time. The following assumptions were made when modelling the collection data in OptimoRoute:

- The 'stopped' status in the activity report was used as a potential bin pick-up address and mapped against the service schedule to pick up all the bins registered for that street/area
- Shift start time was set to be 3 am for the selected collection day
- No breaks or check-in/out time was inserted into the software but an additional 1 hour was added to the optimised collection time to model an actual shift in Hawkesbury
- **A loading time of 20 seconds** has been assumed for each pick-up point. The value for the loading time was retrieved from the 'Kerbside service expansion analysis and estimations' report for HCC developed by Arcadis Pty Ltd. It should be noted that this may be long as the travel time is also included.

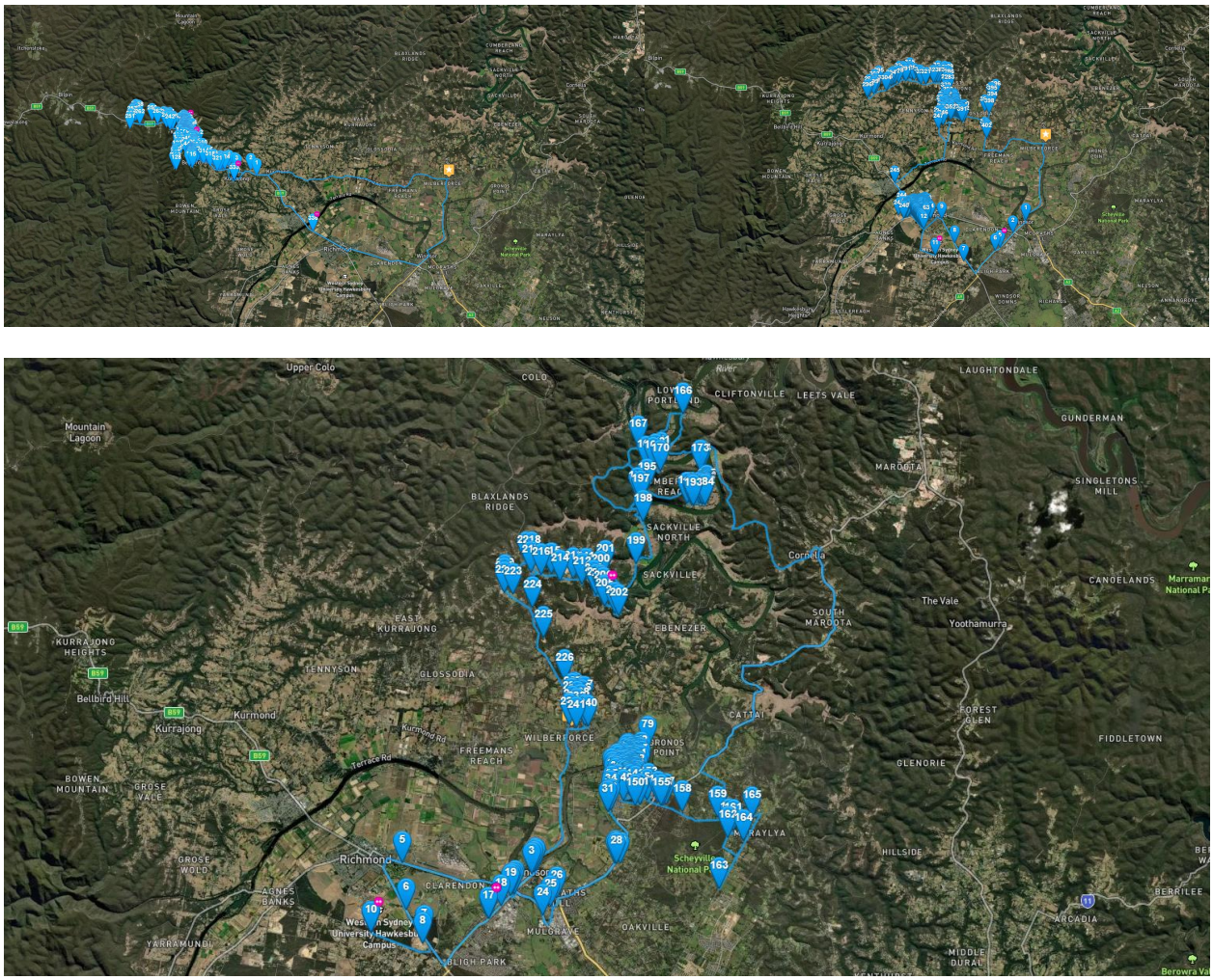
Results from each trial have been summarised in Table 7.

*Table 7: Trial Summary*

| Trial | | | | | Approximate Collection Time (hours) | |
|---|---|---|---|---|---|---|
| Trial No. | Date | Day | Vehicle No. | No. of stops | OptimoRoute | Timesheet based on activity report |
| 1 | 28/11/2022 | Monday | 134 | 336 | 4 | 4 |
| 2 | 11/11/2022 | Friday | 130 | 403 | 7 | 7.25 |
| 3 | 2/11/2022 | Wednesday | 132 | 241 | 6.6 | 9 |

Based on the data in Table 7 above, it looks like the current collection time (route) may be possible to optimise further. However, it should be mentioned that this is only three examples and, the 9h on the activity report vs 6.6h in OptimoRoute, could be due to a break-down on that particular day i.e., so that could be double-checked before any final conclusion can be made.

It was identified that 2 out of 3 days were very similar to the OptimoRoute software output and that most of the routes are close to being optimised. For more precise conclusions, SMEC suggests that more routes will need to be mapped in OptimoRoute, which could be done if HCC considers this to be of interest. Figure **3** below, includes maps of the collection routes that were optimised using the OptimoRoute software.




**3.**

Figure 3: **Optimised Route Trial No. 1, Trial No. 2 and Trial No 3. Refer to**

*Appendix 2: OptimoRoute maps for more details.*

This assessment also indicates that HCC Collection Service may benefit from upgrading its existing location tracking software with an optimisation software system to maximise the efficiency of pickups and determine how best to incorporate future growth. An IT system of that kind would also assist new HCC staff or a temporary driver undertaking collection routes. It could also improve individual tracking of households and contamination monitoring.

## 3.1 Cost-efficiency measures of HCCs collection service

This section looks at the efficiency in the current collection service. It uses the data provided for November 2022 including service schedule, timesheets and the activity reports.

### 3.1.1 Collection Timeframes

To determine the capacity for the existing service to cater for additional properties, SMEC has used the current data to calculate an "average time per lift" and "time to collect per additional household". Below, in **Error! Reference source not found.** the average time taken per pick up has been estimated, including and excluding travel to and from the depot, landfill and break times

The travelling and break time is the sum of the time spent on travel between the depot and landfill, inclusive of a 30-minute lunch break and the two 15-minute check in/out before and after the shift.

*Table 8: Collection Summary for November 2022*

| Collection Summary | |
|---|---|
| Average working time per day in Nov 2022 (all shifts in a day) | 42.3 hours[1] |
| Number of weekly pick-ups | 24,192 bins |
| Number of fortnightly pick-ups | 532 bins |
| Average pick-up time per stop **including** travel and break time | 31.2 seconds |
| Average pick-up time per stop **excluding** travel and break time | 22.7 seconds |

[1] including break time, check in/out time and landfill tipping time

**Cost per lift**

If HCC decide to outsource its collection services in the future, it is prudent to understand the current operational costs (cost per lift). SMEC has calculated the cost per lift, adopting costs provided by Council in the report provided by Arcadis named 'Kerbside service expansion analysis and estimations'. The total costs and cost per lift result is presented in Table 6 below.

*Table 9: Collection Costs and Cost per Lift*

| Collection Categories | 2021/22 FY Cost |
|---|---|
| Amortised Plant Costs[1] | $384,252.61 |
| Plant - Running Costs | $439,862.47 |
| Plant - Rego Inspections Internal | $587.26 |
| Salaries | $182,175.59 |
| Annual Leave Entitlement | $91,537.00 |
| Sick Leave | $60,692.87 |
| Overtime | $142,066.99 |
| Superannuation | $91,448.65 |

| | |
|---|---|
| Allowances | $33,820.62 |
| Public Holidays | $6,221.11 |
| Wages | $604,094.18 |
| Wages costs | $130,094.47 |
| Sick Leave on cost - out doors staff | -$34,194.55 |
| Plant On Costs | $45,713.57 |
| Stores Items | $99,934.61 |
| **Total Collection Cost** | **$2,278,307.45** |
| **Cost per Lift (for (24,192 weekly pickups x 52 weeks) + (532 fortnightly pickups x 26 weeks)** [2] | **$1.79** |
| **Cost per hours active work (1,064h per week from Table 4 above)** | **$41** |
| **Cost per hours active work (889h per week from Table 4 above)** | **$49** |

[1]The amortised plant costs for the year 2019/20 was $362,027. Accounting for 6.1% increase in costs due to inflation, the amortised plant cost for the collection vehicles have been calculated to be $384,253 for the financial year of 2021/22.

[2]24,192 service provided weekly. 532 rural services which are provided fortnightly.

The collection cost categories contained in Table 9 above were extracted from the report produced by Arcadis with costs updated with actual costs for the financial year of 2021 – 2022. The **cost per lift** value has been estimated to be **$1.79** for the 2021/22 financial year. This compares to the previous estimate of $1.74 per lift that Arcadis calculated for their report in 2020.

Applying a further 6.8% increase to account for CPI increases in the 2022/23 financial year elevates the cost per lift to **$1.91.** A further discussion could be had with HCC to determine/confirm that the table above is reflective of the current collection costs and its operation.

### 3.1.2 Room for growth?

As per HCCs forecast, Hawkesbury's households are estimated to grow by approximately 3000[2] households by 2030. From Table 6, average time per pick up, excluding breaks is 22.7 seconds. If the average time per pick up is expected to be between 22.7 and 31.2 seconds (as shown in Table 8), to collect from an additional 3000 households, the collection service will require an additional 18.9 to 26h. This would account for 2.5 to 3.4 extra shifts per week.

Compared to the available or potentially unutilised shifts of approximate 2 shifts per week, this indicates that there may be room to accommodate a growth of up to 2000 household inhouse with the current fleet, as long as the routes are optimised, and the shifts utilised to its maximum capacity.

If the collections are reduced to fortnightly service provision, due to introduction of FO or FOGO service, there would be sufficient capacity to accommodate growth for 3000 households.

#### 3.1.2.1 Resource recovery - Impact on Red lid bin collection

There are several initiatives that HCC could introduce to achieve higher resource recovery rates. One of those is the introduction of a FOGO service. Should HCC decide to roll out a FOGO service with reduced red lid bin collection frequency (i.e., 240L or 140L bins collected fortnightly), the collections would reduce from the number of current weekly collections 24,453 to 12,226 per week. Noting that there may be more than 50 percent as some households e.g., large households or households with young children using nappies, are likely to want to retain weekly collections.

If applying the collection time of 22.7 to 31.2 sec per pick up (refer to Table 9) the impact on driving time is likely to be a reduction of between 77h to 106h per week (10-13 shifts per week).

Other initiatives that HCC could implement to encourage further source separation include:

1. provide a larger 360L bin for co-mingled recycling

[2] Further information available in the Resource Recovery memo

2. consider collecting certain materials separately from the co-mingled bin and collect for example both a glass and a co-mingled bin with a Rear lift vehicle that has a twin-pack.
3. undertake a rear lift collection (in comparison to a side lift collection) approach is likely to improve contamination monitoring, which again will improve HCC's resource recovery.

There are more service collections and combinations that could be considered. How far this is progressed will depend on Hawkesbury's appetite to improve recourse separation at the source and an assessment of overall cost benefits.

## 3.2 Conclusions – current collections

Based on the analysis undertaken, the following conclusions can be made:

- Is current collection system efficient?

The data reviewed for HCC's Collection Service show that the existing collection service is collecting all registered bins regularly, however, collection time and route **may benefit from being fully utilised and potentially optimised** by using route optimising software to include future growth to the collection routes and to provide accurate record keeping of shift hours and vehicles usage.

- Do HCC have space for growth (2000 to 3000 extra households)?

HCC is expecting growth of **3000 additional households** for collection in Hawkesbury by 2030, the collection staff will have to accommodate for an additional 19 - 26 hours of collection. From the analysis undertaken, it appears that HCC could incorporate up to 2000 households into their current collection operations through grater utilisation of current fleet. To service up to 3000 households, HCC would require additional resources to complete the services in the form of an additional truck operating at 18% utilisation and staff to support.

- How does the collection impact when they transition over to FOGO (if refuse will be fortnightly)?

If the HCC decides to introduce a FOGO service, the tonnage presented in the residual waste bins will decrease significantly. HCC will have the option of either maintaining a weekly collection frequency of the residual bin or reduce services to a fortnightly collection. If maintained at a weekly collection frequency, the number of bins per load could be increased as the weight of each bin should be significantly reduced.

# 4. Option Analysis

**Type of collection**

1. **Inhouse collection**: Using current contract arrangement (inhouse) but expand to allow for future growth.
2. **Outsource**: Use a waste collection contractor.

**Transport material to disposal facility**

3. **Direct travel** to closest disposal facility in the future once landfill has closed (travel every day) vs
4. Constructing a **Waste transfer station** for bulk haulage to closest disposal facility.

The closest EfW precinct and landfills are listed in Table 10, with West Lithgow precinct currently being the closest EfW facility. It should be noted that there is a notice to revoke this precinct.[3]

*Table 10: List of EfW precincts in NSW*

| EfW precinct | Location (~drive time one way) |
|---|---|
| West Lithgow Precinct | 1h 10 min |
| Parkes Activation Precinct (closest EfW precinct) | 4h |
| Goulburn precinct | 5.5h |
| Richmond Valley | 10h |

[3] Energy Recovery Facilities, Accessed 16th of May, https://www.epa.nsw.gov.au/your-environment/waste/waste-facilities/energy-recovery

The current closest landfill is Blaxland landfill, located 30km away, with an approximate 30 - 40 min drive time from Hawkesbury. If Council's current landfill is closed, it will have to choose between another landfill site or an EfW facility once operational.

## 4.1 High level costing

Below is some indicative costing for the different scenarios/options.

**Collection Option 1 - Inhouse collection – allow for future growth**

If HCC decide to continue operating its current inhouse collection service, then HCC may choose to pursue any of the following scenarios with the individual cost outcomes outlined below, to accommodate for population growth.

1. **Additional hours added on the current operation:** Based on the current efficiency rate, and that the growth will incur between 19 to 26 hours per week, HCC will need to pay ~ $1200-$1700 extra per week to accommodate weekly collection for another 3000 households by 2030.
2. **Optimise and use underutilised time:** If it is possible to use the "potential" available down time and optimise the routes to absorb two shifts into the current routes, then the collection time would increase with 0.5 – 1.4 shifts per week (7.6h each). If HCC use current vehicle fleet to collect the extra household bins, then they it would cost them between $250 to $2600 extra per week.
3. **Absorb growth into current collection schedule**: If the shifts are absorbed within the current collection schedule, then no further costs will need to be paid. If FOGO is implemented with a reduced collection frequency this would be possible and even reduce yearly collection cost for HCC (noting that this cost would be counteracted by paying for additional FOGO lifts).

**Collection Option 2 - Outsourced collection**

Current lift price for green waste and co-mingled bins is not available to SMEC. This option would require HCC to cease its internal in-house collection service. This will reduce internal budget and cost for labour, fleet, fuel and other admin related costs; however, HCC would still need to pay for the FOGO bins, caddies, bin liners and delivery of those (unless this too is outsourced). Costings per lift below is made for 30,000 households (which allows for growth until 2030, refer to growth table in Resource recovery MEMO) it does not include additional costs for bins, kitchen caddies, bin liners and delivery of those.

| Service option | Cost per lift | Total cost weekly FOGO | Total cost if fortnightly FOGO |
|---|---|---|---|
| Waste collection contractor MIN | $1.80 per lift | 2.8M | 1.4M |
| Waste collection contractor MAX | $2 per lift | 3.1M | 1.6M |

The total collection cost is not taking into consideration if/when a contractor may need to travel longer distance for disposal. It is assumed the bins are tipped at HCC landfill and/or a future Waste Transfer Station at Hawkesbury's Waste Management Centre.

**Transport Option 1 - Direct travel**

If HCC choose to utilise the closest available alternative facility for disposal, additional time will be required to complete each load compared to current collection timeframes.

The additional time to/from the nearest alternative landfill has been estimated at 1.5 hours. The additional time to/from the nearest future EfW facility has been estimated at 3 hours. The additional costs as a result of the extra travel time is shown in table 10 below. The additional costs assume an hourly cost of approximately $41 per hour.

*Table 11: Extra cost for direct travel*

| | | | Extra transport cost per annum ($) |
|---|---|---|---|

| Direct travel for 51 loads per week) | Time for roundtrip (h) | Extra (h) per week | Cost per 1064 hours of active work | Cost per 889 hours of active work |
|---|---|---|---|---|
| **Roundtrip to nearest landfill** | 1.5 | 3978 | $163,806.88 | $196,052.33 |
| **Roundtrip to nearest EfW** | 3 | 7956 | $327,613.76 | $392,104.66 |

With current average shift length of 6.8 to 7.6 hours (see Table 5: November 2022 Summary by Working Days) there is sufficient capacity for the drivers to meet their fatigue management driving limits while traveling to and from both the nearest landfill for one (1) load and to the nearest EfW for one (1) load before they reach their driving hours limit under NHVL.

This could be mitigated by additional fatigue management training. With Basic Fatigue Management training providing an additional one (1) hour of driving time. This would allow for disposal of up to two (2) loads at the nearest landfill but not provide for any additional disposal at EfW facility.

Should HCC choose they could make an application for Advanced Fatigue Management however there would be additional costs and time required for administration and training. It would also reduce flexibility in the workforce management and may not provide the additional driving hours to allow for a second load to be disposed of at EfW facility.

**Transport Option 2 - Waste transfer station – bulk haulage**

Below we have estimated the cost of transport if a Waste Transfer station is constructed to manage Council waste instead. Both CAPEX/OPEX and transport cost has been calculated to compare with the other options above. The CAPEX/OPEX below has been outlined in the **Resource Recovery MEMO**. The overall cost is significantly reduced if external waste is accepted to a gate fee to the Waste Transfer Station.

*Table 12: Additional cost for using a waste transfer station*

| Size of transfer station | Min total cost ($) | Max total cost ($) |
|---|---|---|
| **Small (10k tpa)** | $84/tonne<br>$840,000 | $108/tonne<br>$1,008,000 |
| **Medium (20k tpa)** | $85/tonne<br>$1,700,000 | $110/tonne<br>$2,200,000 |
| **Large (30k tpa)** | $62/tonne<br>$1,860,000 | $82/tonne<br>$2,460,000 |

Note: The above costs are high level and assume a range of inputs, including design parameters that need to be qualified.

Assumptions applied for calculating the costs above include:

- The small facility assumes a 30m3 bin, with a compaction rate of 300kg/m3; the medium/large facility assumes a 60m3 bin with compaction rate of 370kg/m3, based on SMEC internal industry knowledge and industry advice.
- A range of $40 to $60 per tonne has been applied for transport of waste
- It should be noted that the land preparation costs has not been included above only civil construction.
- Operational costs for the transfer stations are not included in the above costs.

## 4.2 Pros and cons for each option

Below is an initial pros and cons which will be further explored in the Multi Criteria Analysis (MCA).

*Table 13: High-level pros and cons per option*

| Option | Pros | Cons |
|---|---|---|
| **Collection Options** | | |
| **Inhouse** | Greater control over costs<br>Provision of ongoing job opportunities for local staff (low social acceptance risk)<br>Flexibility to make changes to services, including vehicle fuel type. | Requires extra time per week, which will lead to more staff, shifts and vehicles to manage.<br>More expensive if HCC need to increase vehicle fleet to accommodate growth<br>Higher risk for HCC staff<br>Less expertise than specialist companies |
| **Outsourced** | Reduce risk to HCC<br>Reduce cost - likely to be a cheaper overall service due to competitive tendering process<br>Obtain technology benefits from collection company<br>Possibility to enter into joint contracts with surrounding Councils | Requires a contract manager for collection contract<br>Tender timing issues - preferable to tender for waste, recycling services as a single contract to gain efficiencies<br>Hard to influence the cost per lift other than initial competitive tender<br>Higher social risk (by removing HCC operation)<br>May be difficult to transition to alternative fuel vehicles |
| **Transport Options to Alternative Disposal Location** | | |
| **Direct travel** | Easy and quick implementation option as does not require any new infrastructure<br>More space for resource recovery options or other uses at Hawkesbury Waste Management Facility | Likely to increase overall costs of the collection service<br>Long travel time for collection, more wear and tear on vehicles, greater safety risk<br>Increased greenhouse gas emissions and higher fuel costs<br>Increased movements of Heavy Vehicles<br>Could limit ability to adopt alternative fuel vehicles<br>Total driving hours under NHVL will limit implementation and options for disposal |
| **Waste Transfer station** | Will allow residents to continue self-hauling their landfill waste<br>Provides job opportunities for local staff<br>Requires construction to be undertaken<br>Encourages landfill diversion | Larger investment cost and higher operational cost<br>Cost-efficiencies when HCC can charger revenues for external waste<br>Requires construction and increases the operational risk at Hawkesbury |

Note: further advice and recommended options will be provided following the completion of the MCA.

# Appendix for Collection MEMO

# 5. Appendix 1: Detailed breakdown of bins collected per suburb

SMEC has Column 4 in Table 1, below, identifies additional suburbs which were not listed in the original schedule, however, are indicated in the supplied maps for the collection ***days.***

*Table 14: Detailed overview of Bin Collection Days and Suburbs.*

| Collection Day Summary | Additional Information | | | |
|---|---|---|---|---|
| | Suburb | # of Bins to collect | Additional suburbs found on the collection maps | # of Bins to collect |
| **Monday** | | | | |
| **Total number of suburbs 13** | Bilpin | 292 | Kurrajong Hills | 237 |
| | Kurrajong Heights | 514 | Mountain Lagoon | 44 |
| | Kurmond | 256 | The Slopes | 104 |
| | South Windsor | 2364 | Berambing | 36 |
| | North Richmond | 156 | Wheeny Creek | 5 |
| | Windsor | 38 | | |
| **Total number of Bins:** | Bligh park | 694 | | |
| **5014** | Kurrajong | 274 | | |
| **Tuesday** | | | | |
| **Total number of suburbs 10** | Richmond | 1418 | Richmond Lowlands | 4 |
| | Grose Vale | 356 | Clarendon | 48 |
| | Grose Wold | 211 | Cornwallis | 1 |
| **Total number of Bins 5533** | North Richmond | 2115 | Freemans Reach | 133 |
| | Windsor | 622 | | |
| | Bligh Park | 625 | | |
| **Wednesday** | | | | |
| **Total number of suburbs 15** | Wilberforce | 989 | Lower Portland | 119 |
| | Ebenezer | 329 | Cattai | 153 |
| | Pitt town | 1282 | Cumberland Reach | 76 |
| **Total number of Bins 4316** | Maraylya | 177 | Sackville | 87 |
| | Windsor | 246 | Pitt town Bottoms | 2 |
| | Bligh park | 312 | East kurrajong | 148 |
| | | | Oakville | 210 |
| | | | McGraths Hill | 108 |
| | | | South Windsor | 78 |
| **Wednesday Fortnightly A** | | | | |
| **Total number of suburbs 4** | Colo | 18 | Upper Colo | 3 |
| | Colo Height | 93 | Central Colo | 4 |
| **Total number of Bins 118** | | | | |
| **Wednesday Fortnightly B** | | | | |

| Collection Day Summary | Additional Information | | | |
|---|---|---|---|---|
| | **Suburb** | **# of Bins to collect** | **Additional suburbs found on the collection maps** | **# of Bins to collect** |
| **Total number of suburbs**<br>**10**<br><br>**Total number of Bins**<br>**414** | Upper Macdonald | 21 | Webbs Creek | 12 |
| | Higher Macdonald | 2 | North Webbs Creek | 3 |
| | Central Macdonald | 30 | Wrights Creek | 6 |
| | St Albans | 89 | Leets Vale | 28 |
| | Lower Macdonald | 193 | Wisemans Ferry | 30 |
| **Thursday** | | | | |
| **Total number of suburbs**<br>**18**<br><br>**Total number of Bins**<br>**4657** | Bowen Mountain | 561 | South Windsor | 130 |
| | Oakville | 395 | Freemans Reach | 558 |
| | McGraths Hill | 758 | Mulgrave | 114 |
| | Windsor | 19 | Vineyard | 295 |
| | Bligh Park | 672 | North Mulgrave | 10 |
| | Kurrajong | 533 | South Mulgrave | 12 |
| | | | Grose Vale | 48 |
| | | | Kurmond | 62 |
| | | | Wilberforce | 22 |
| | | | Glossodia | 3 |
| | | | Windsor downs | 381 |
| | | | Maraylya | 84 |
| **Friday** | | | | |
| **Total number of suburbs**<br>**13**<br><br>**Total number of Bins**<br>**4672** | Glossodia | 978 | Agnes Banks | 187 |
| | East kurrajong | 514 | Tennyson | 134 |
| | Blaxlands ridge | 180 | Wilberforce | 25 |
| | Hobartville | 1104 | Richmond | 979 |
| | Yarramundi | 241 | Freemans Reach | 10 |
| | North Richmond | 27 | | |
| | Windsor | 19 | | |
| | Kurrajong | 274 | | |

# 6. Appendix 2: OptimoRoute maps

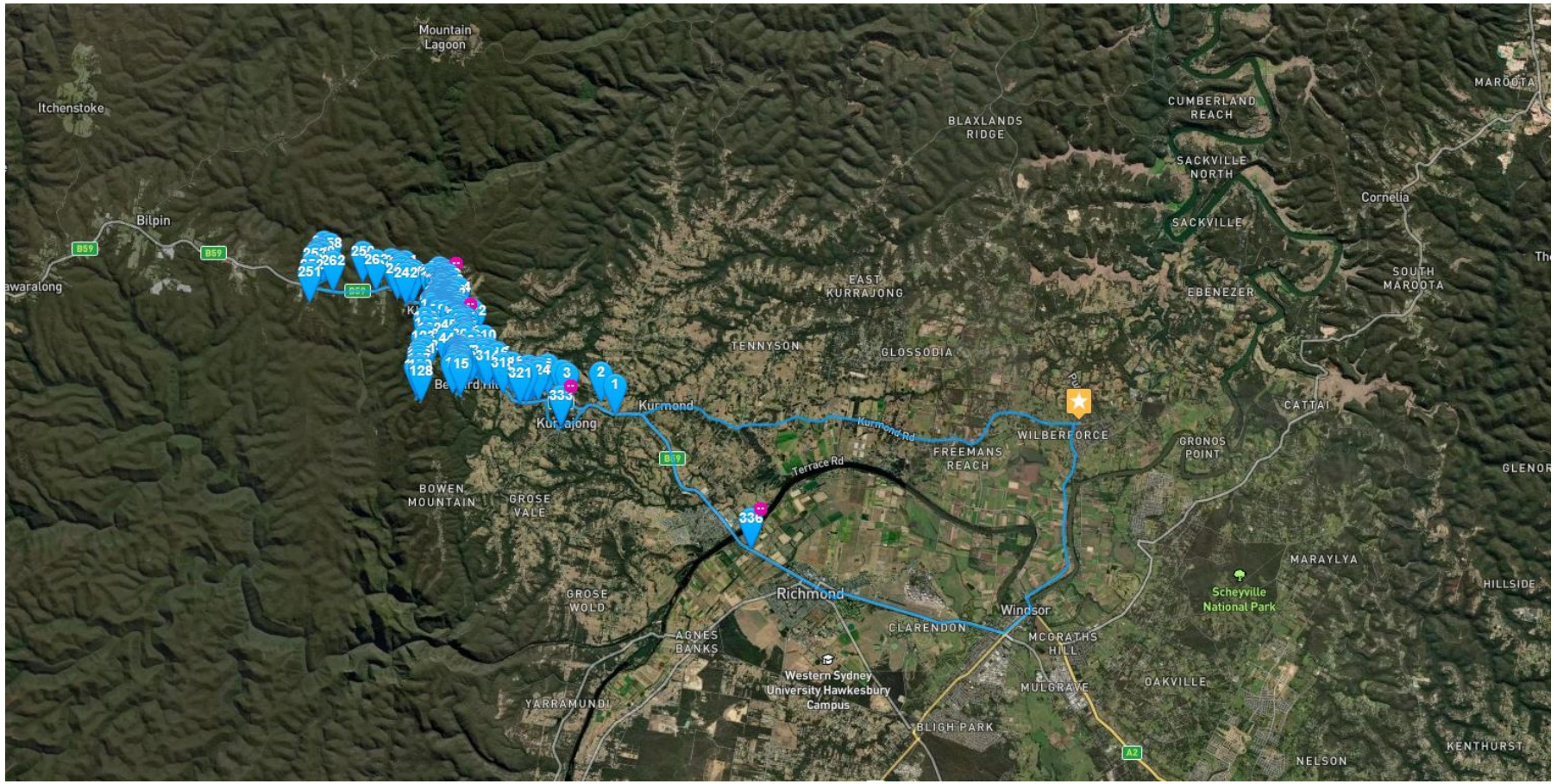



*Figure 4:* ***Optimised Route Trial No. 1***

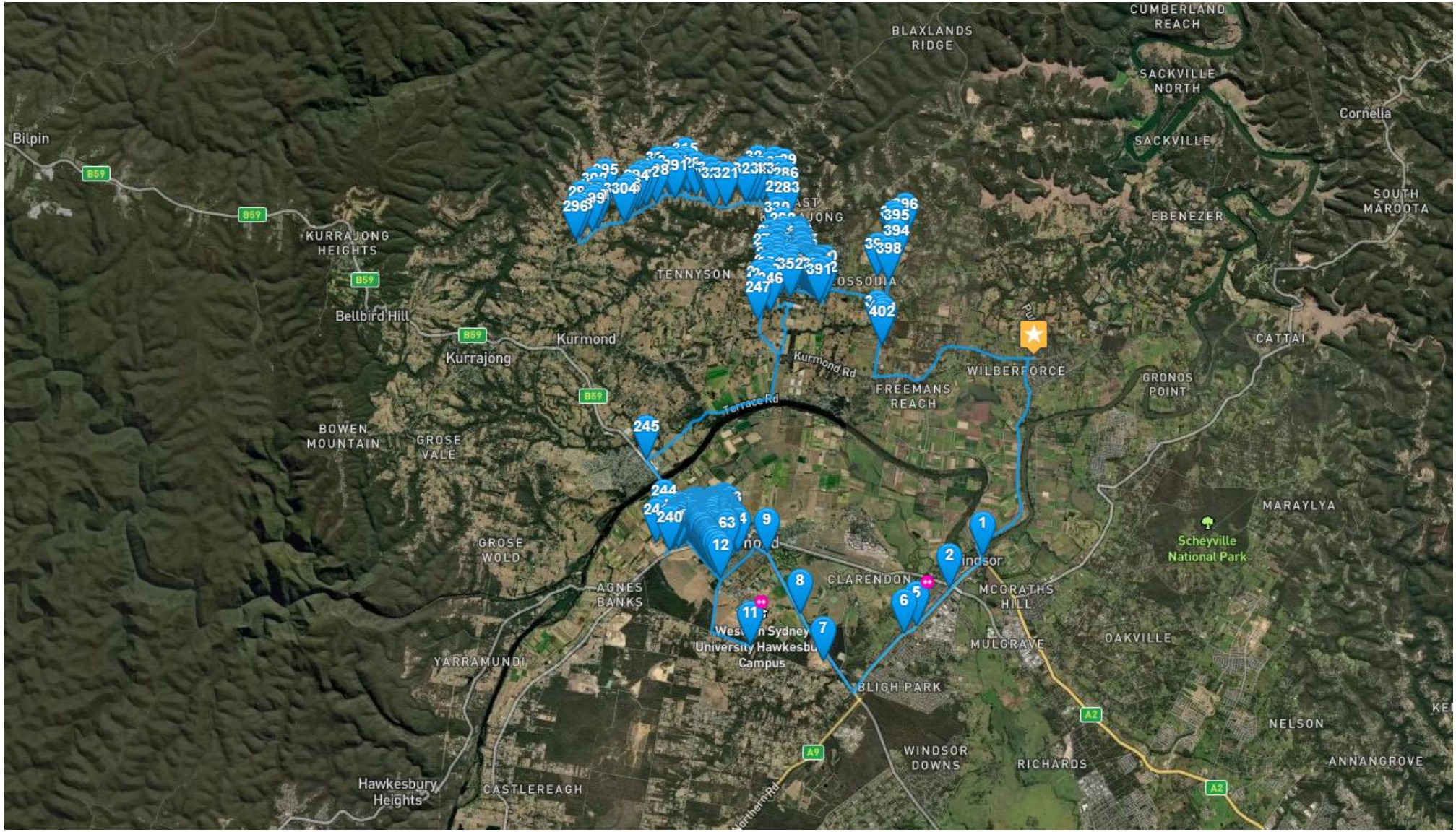



*Figure 5:* ***Optimised Route Trial No. 2***

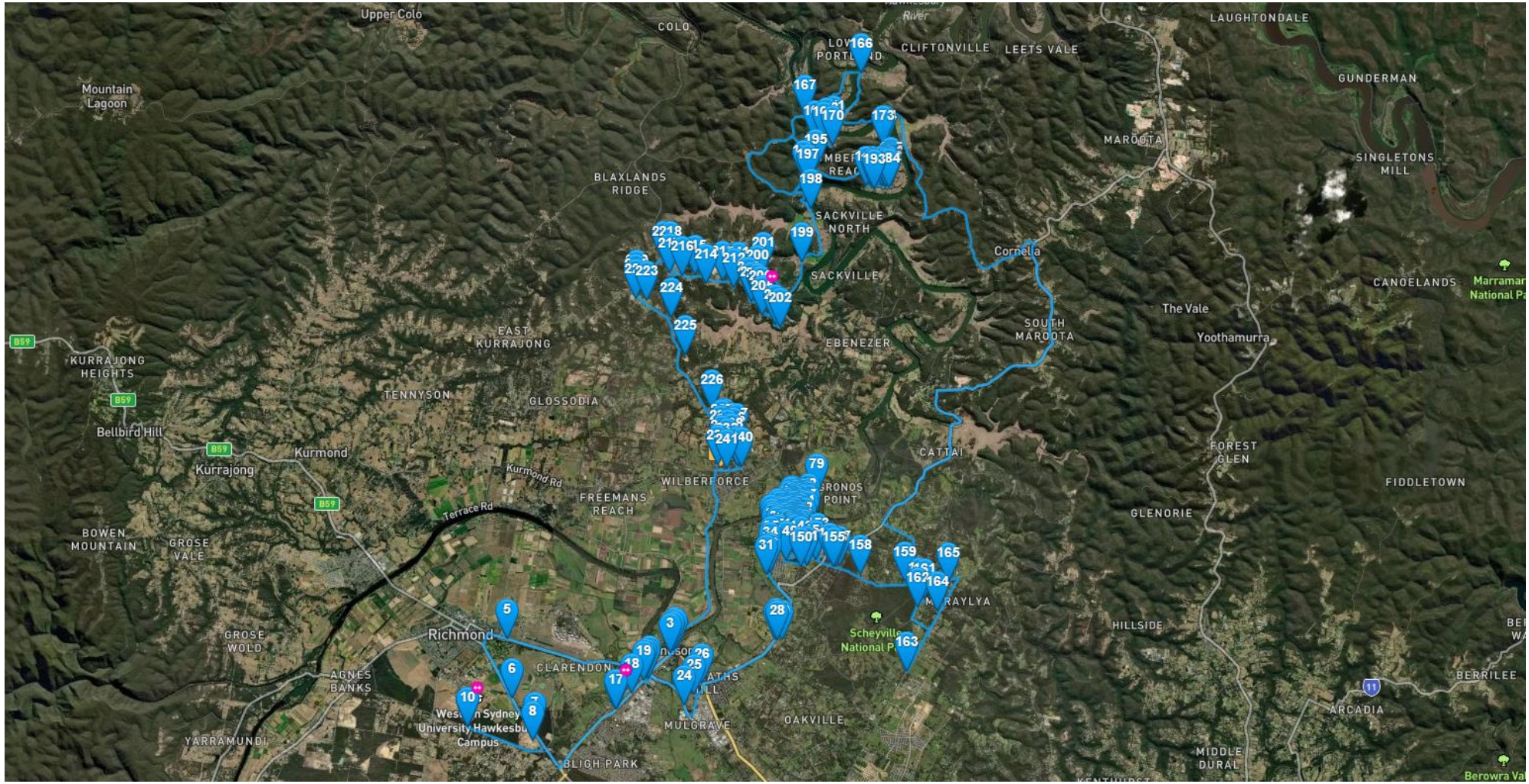



*Figure 6:* ***Optimised Route Trial No. 3***