GAMUDA

LAING O'ROURKE

Annual Sustainability Performance Review

June 2022 to September 2023

Published February 2024

Introduction

Sydney Metro is Australia's biggest public transport project – building, operating, and maintaining a network of four metro lines, 46 stations and 113km of new metro rail. Sydney Metro is revolutionising how Australia's biggest city travels, connecting Sydney's north west, west, south west and greater west to fast, reliable turn-up-and-go metro services with fully accessible stations.

The NSW Government is delivering Sydney Metro West, a new underground metro railway which will double rail capacity between Parramatta and the Sydney CBD, link new communities to rail services and support employment growth and housing supply.

Sydney Metro West (SMW) stations have been confirmed at Westmead, Parramatta, Sydney Olympic Park, North Strathfield, Burwood North, Five Dock, The Bays, Pyrmont, and Hunter Street in the Sydney CBD. Sydney Metro has been granted planning approval to construct twin underground rail tunnels between Westmead and Hunter Street in the Sydney CBD for SMW. Two potential station locations are being investigated west of Sydney Olympic Park, including one at Rosehill Gardens which could support a significant increase in housing.

The new 24-kilometre SMW tunnel and excavation works will be delivered in three contracts – the Western Tunnelling Package (WTP), the Central Tunnelling Package (CTP) and the Eastern Tunnelling Package (ETP). The Gamuda and Laing O'Rourke Consortium (GLC) has been awarded the contract to deliver the Western Tunnelling Package (WTP) (hereafter referred to as the Project), which includes:

- Twin nine-kilometre tunnels from Sydney Olympic Park to Westmead.
- A tunnel boring machine (TBM) launch site at Rosehill services facility, tunnelling first towards Sydney Olympic Park and relaunched from Rosehill towards Westmead.
- Roadheader excavation to construct spur tunnels and junction cavern to connect the main metro line to the stabling and maintenance facility.
- Earthworks, retaining structures, drainage and utilities corridor for the Clyde Stabling and Maintenance Facility.
- Excavation and civil works for Parramatta and Westmead stations.
- A segment manufacturing facility at Eastern Creek constructing over 60,000 segments to line the tunnels.

This review will focus on the GLC's sustainability performance in the following key areas:

Resource usage

Workforce development

Stakeholder engagement

Social procurement

Infrastructure Sustainability Council (ISC) progress

Opportunities for improvement

ENERGY

electricity and fuel consumption

Project requirements

25% reduction in greenhouse gas emissions (Scope 1 and 2) below a base case footprint.

25% overall, reduction in total greenhouse gas emissions (Scope 1, 2 and 3) below a base case footprint.

30% offset of Scope 1 and 2 emissions.

Performance

GLC is on currently on-track to exceed all energy-related requirements. This is largely due to the Sustainability in Design process followed on the Project (as illustrated in Figure 1 below) and that GLC will be using GreenPower for the Project's High Voltage (HV) construction electricity needs which equates to 96% of the total forecasted electricity usage on the Project. This greatly reduces the carbon impact of the Project as ~60% of the energy-related carbon emissions are associated with electricity usage.

Sustainability in Design process

Sustainability in Design Workshops

Five Sustainability in Design workshops were held to identify initiatives and opportunities. An online interactive platform was utilised to enable all participants to brainstorm and record opportunities relevant to their package of works attendees from across various disciplines and teams were included in the workshops.

Review and confirmation of initiatives end opportunities

Following the initial workshop, separate meetings were held with design leads to confirm the opportunities identified during the workshop, obtain specific details such as design drawings and explore further potential initiatives.

Ongoing engagement throughout design stages

Details of initiatives are inserted into design reports to track relevant design optimisations. Design leads are progressively consulted throughout each design stage to confirm implementation of initiatives and record any further opportunities.

Figure 1: Sustainability in Design process.

The solar panels at the Project's Clyde site will power the Tunnelling & Infrastructure Academy.

The initiatives identified by GLC during the workshops resulted in reduction in materials usage and improved construction methodologies which reduced the need to expend energy (fuel and electricity required to construct the infrastructure elements).

The three key design initiatives that contribute to the largest energy reductions are:

- Changes to the Clyde dive structure which reduced the overall length.
- Reduction in the length of the water conveyance structure.
- The construction of an overpass at Unwin Street rather than the proposed underpass.

The Project also purchased Australia-first rapidly deployable solar hybrid system that only requires 0.5 labour hours for deployment for each of the 80kWp solar arrays. It is also deemed to be the largest system used during construction to date. This system powers various end uses at the Project's Clyde and Eastern Creek Precast Yard sites, including the Project's training facility at Rosehill.

The Project has consumed 3,244,856 kWh of electricity for site offices up to the end of September 2023. Figure 2 illustrates the usage of grid electricity and Figure 3 the usage of GreenPower for construction. This translates to 93% of the Project's construction electricity usage coming from GreenPower during the reporting period.

The Clyde mobile solar farm comprises of 240kWp rapidly deployable arrays.

TBM Dorothy is the second autonomous TBM to be used in Australia.

As a result of the Design Stage 3 Energy Model, GLC estimates that over 113,064,336 kWh of electricity will be consumed during the entire construction phase. Total electricity consumption includes the tunnel boring machines (TBMs), roadheaders, temporary tunnel lighting and ventilation as well as site offices, crib sheds, and other onsite electrical plant and equipment.

The electricity used to date represents 3% of the total estimated electricity consumption for the construction phase of the Project. This percentage usage – which is relatively low to the expected usages – is indicative of the early works phase of tunnelling. TBM 1 and TBM 2 launched in Q2 and Q3 2023 and as a result, consumption will now increase exponentially from this point.

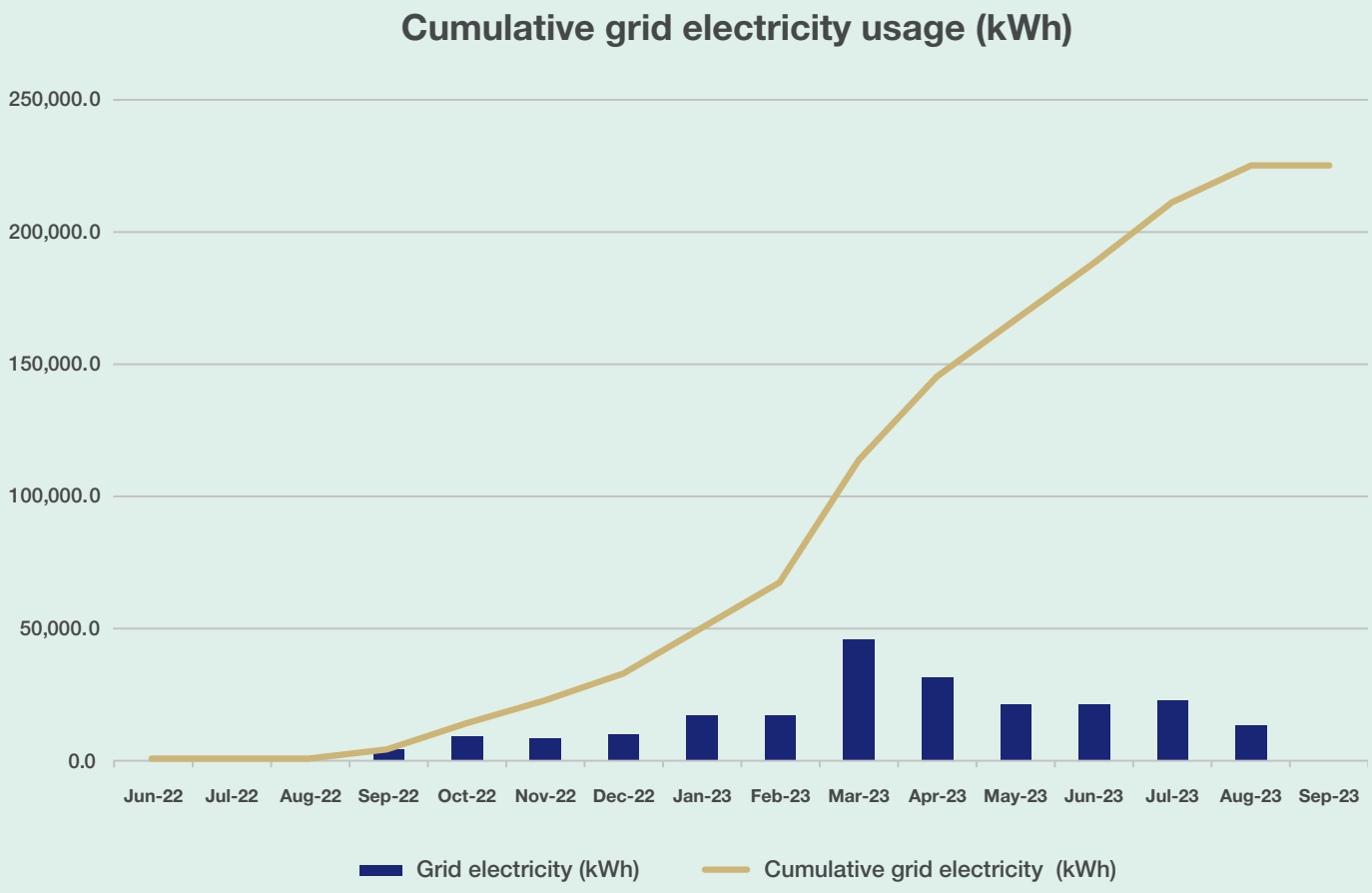


Figure 2: Cumulative grid electricity usage (kWh).

A 20kWp mobile solar farm supplements the Eastern Creek Precast facility's electricity needs.

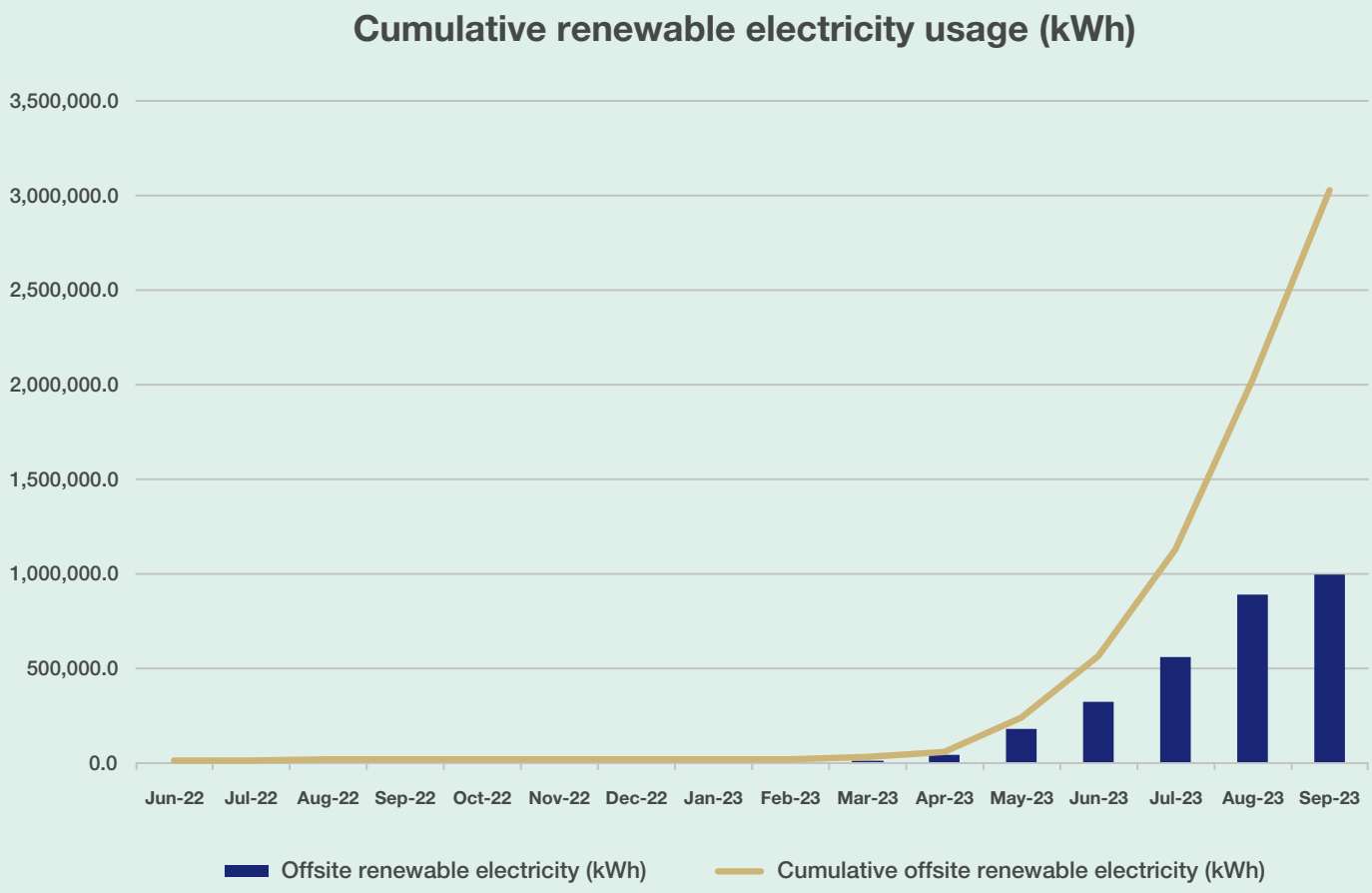


Figure 3: Cumulative renewable electricity usage (kWh).

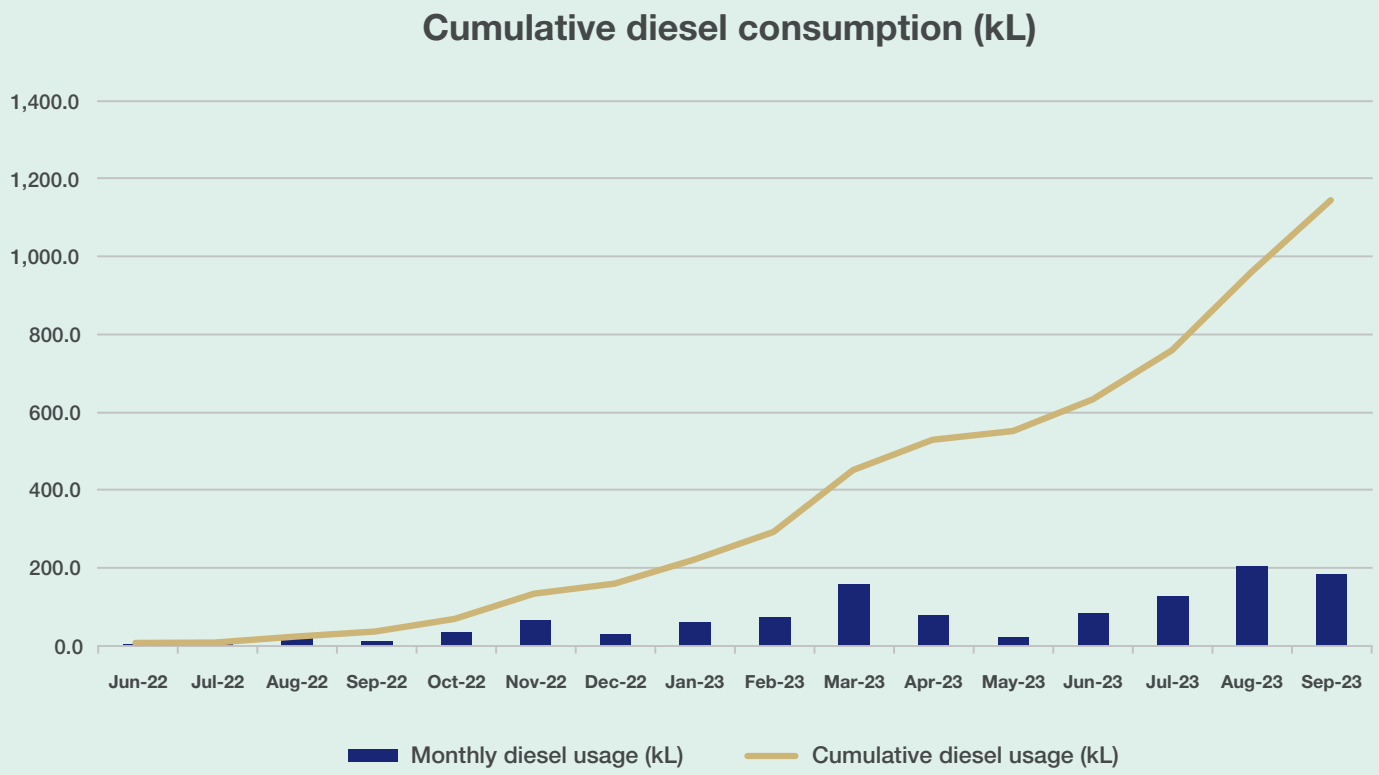


Figure 4: Cumulative biodiesel (B5) consumption (kL).

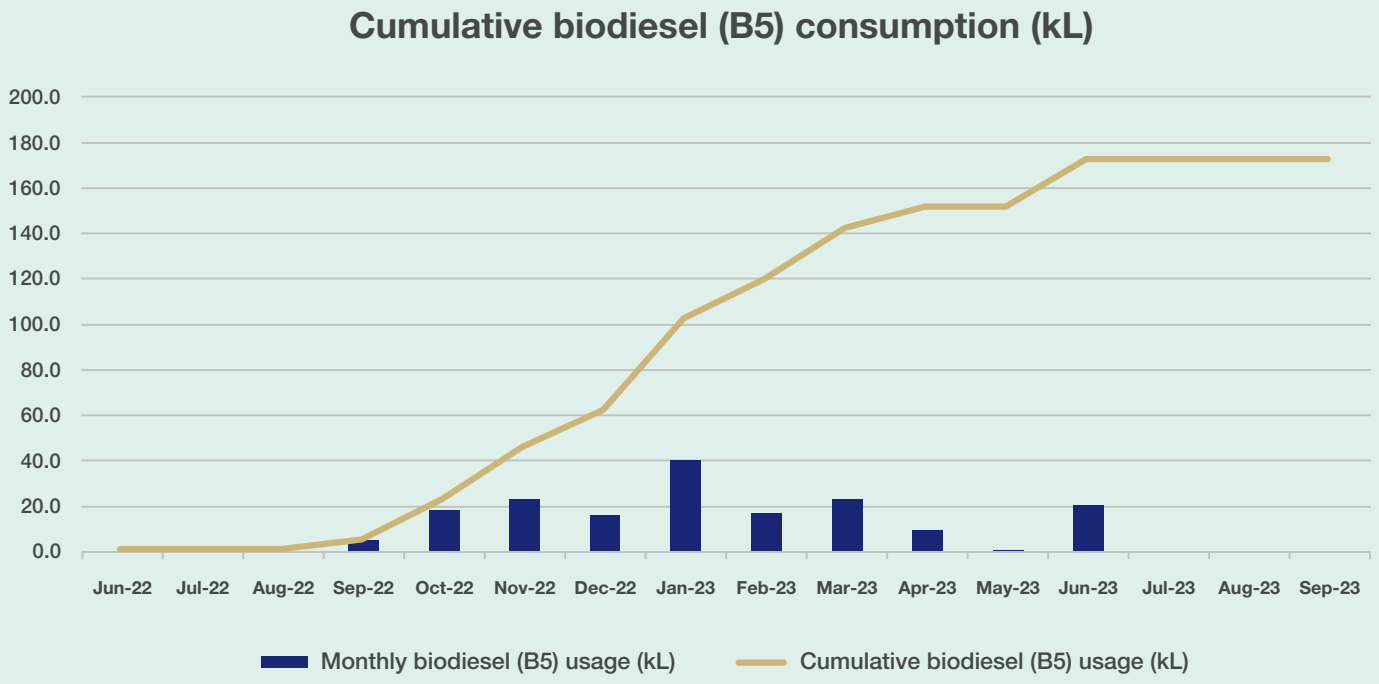


Figure 5: Cumulative biodiesel (B5) consumption (kL).

As at September 2023, the Project has consumed: 1,144 KL of diesel (Figure 4), 172 KL of B5 biodiesel (Figure 5), 3.9 kL of petrol (Figure 6).

The Design Stage 3 Energy Model indicates that ~16,700 kL of diesel will be consumed on the Project.

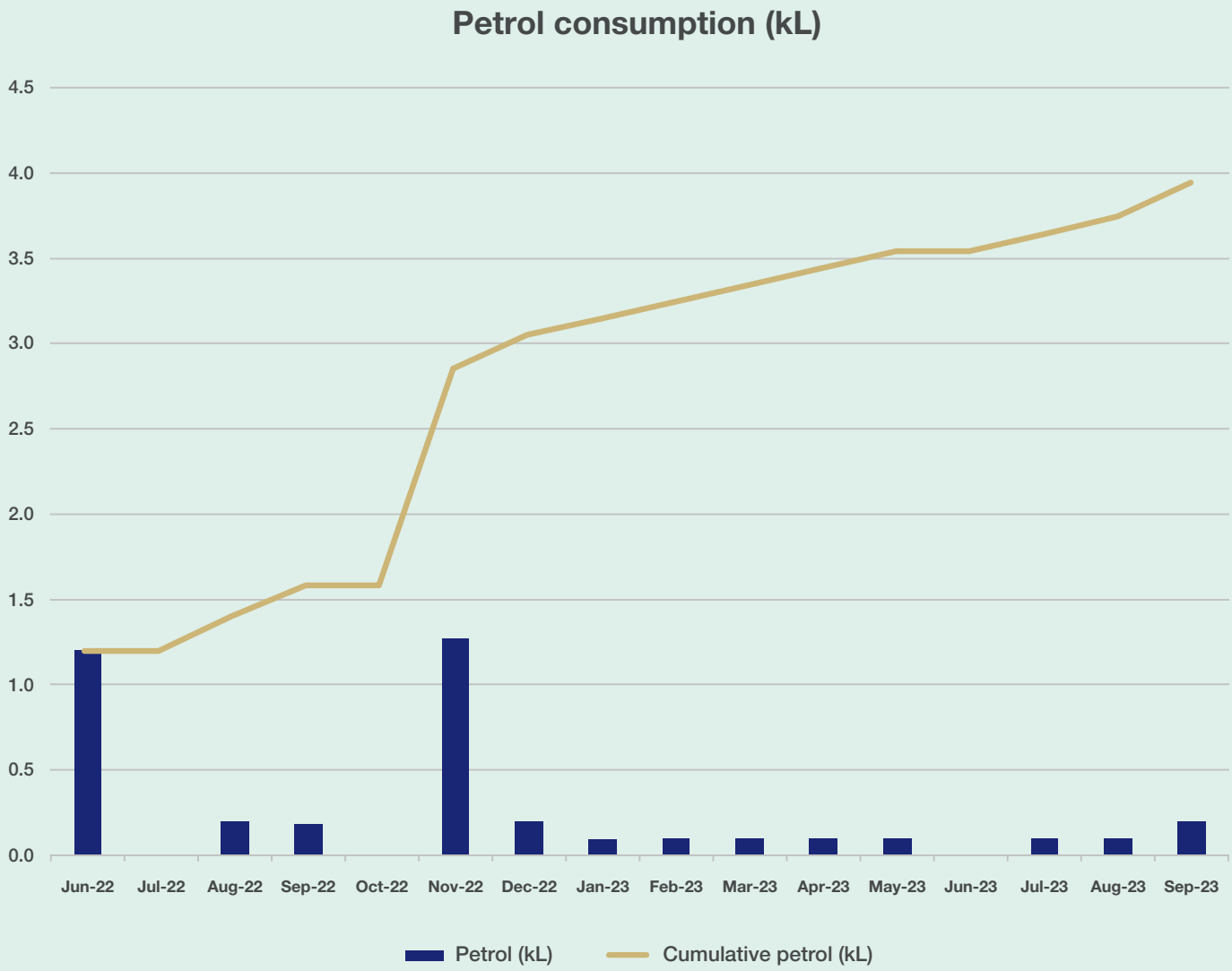


Figure 6: Petrol consumption (kL).

B5 biodiesel has been used in various pieces of plant across the Project's construction sites.

WATER

water consumption and non-potable replacement

Project requirements

10% overall reduction in overall potable water consumption.

40% of construction water sourced from non-potable sources.

Performance

Reduction of potable water consumption

During preliminary stages of the Project, GLC undertook a water balance study to analyse end uses and potential water sources.

The Design Stage 3 water model indicates a 10% reduction of water use when compared to a base case adjustment, calculated through use of the reverse base case (back-casting) modelling approach. Water reduction initiatives include:

- High NABERS water rating for construction site offices.
- High efficiency fixtures and fittings.
- Construction method updates to remove water-intensive activities (e.g. dry vacuum digging).

The Project's water treatment plant at Clyde.

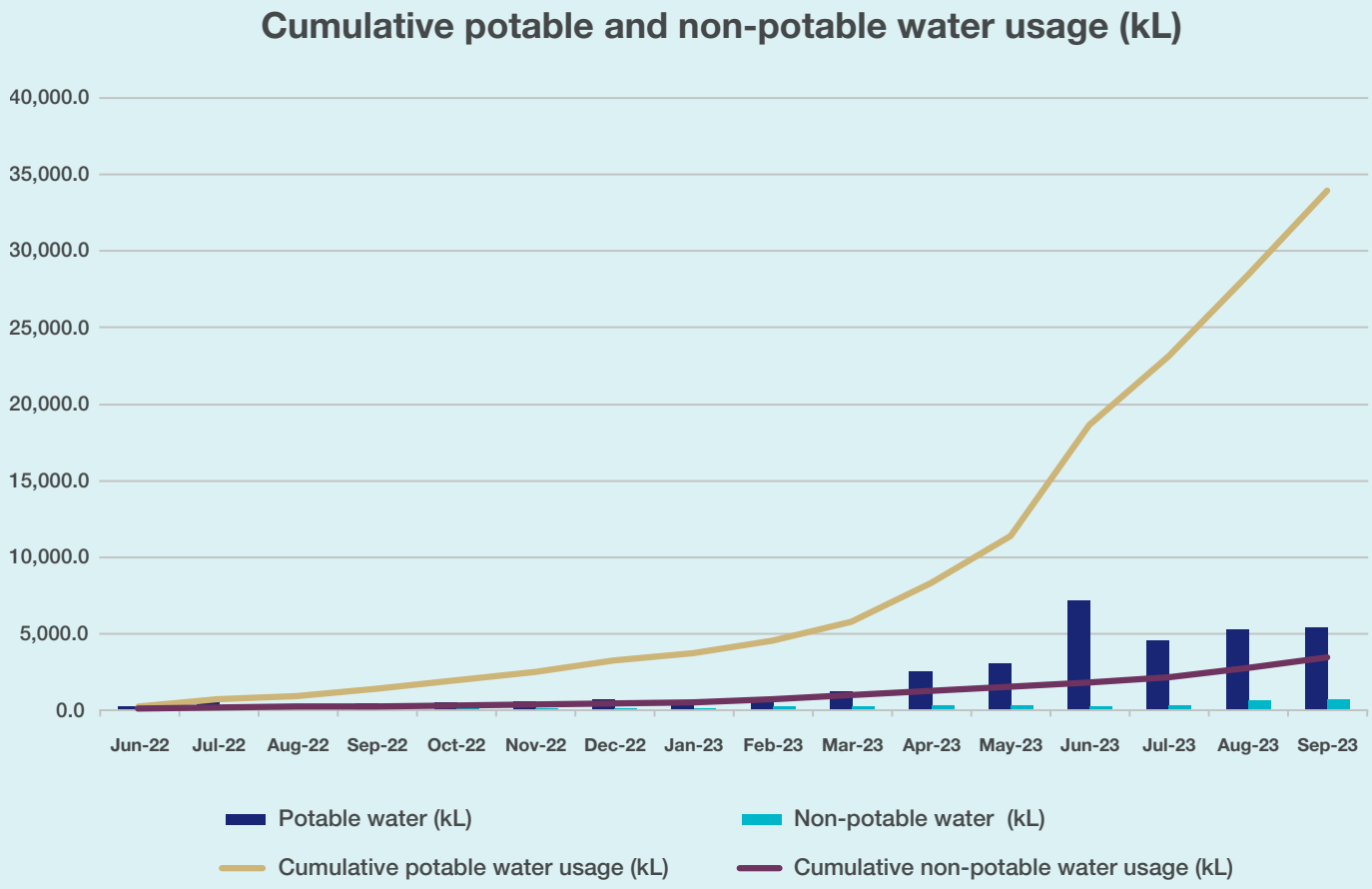


Figure 7: Cumulative potable and non-potable water usage (kL).

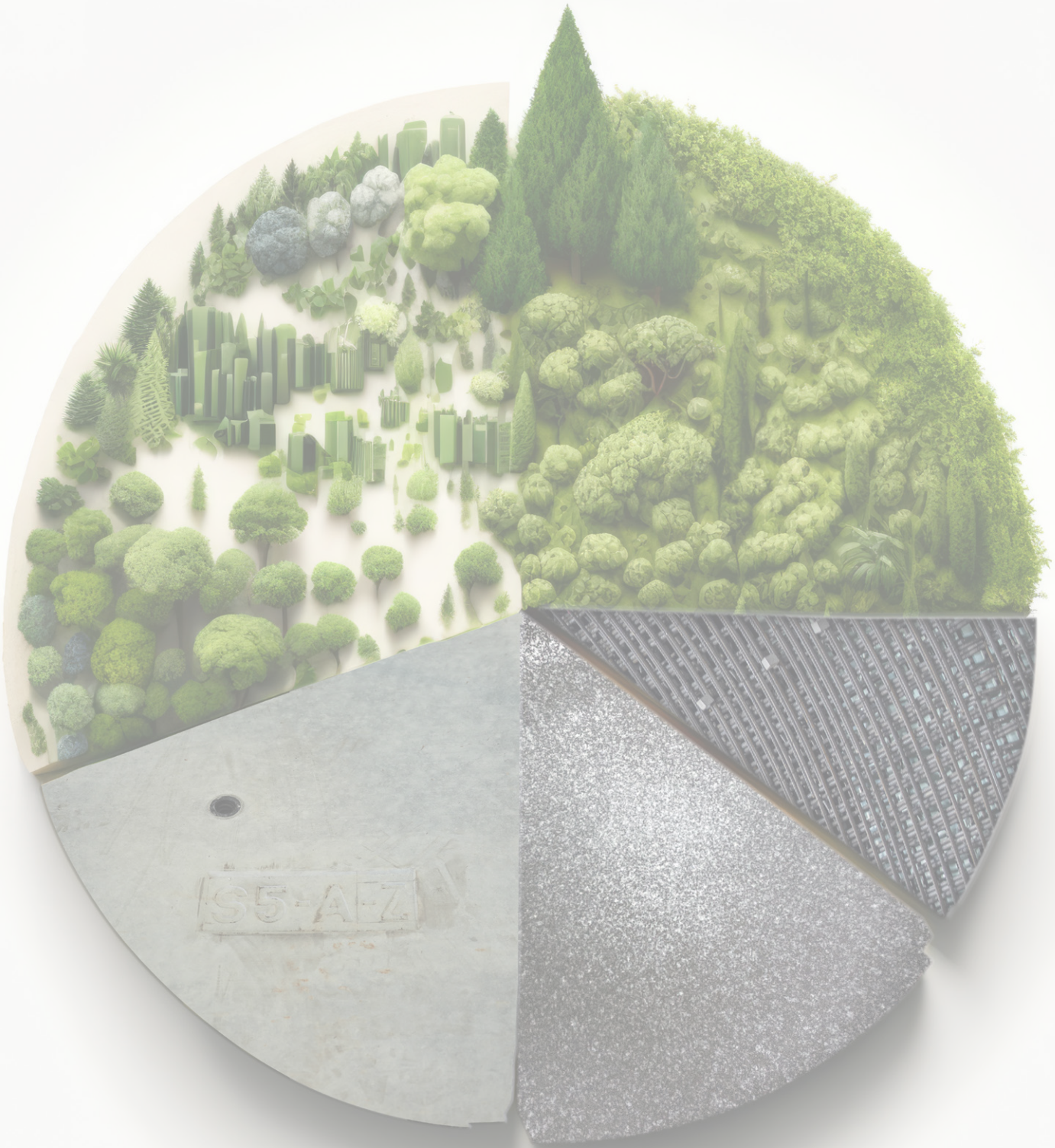
Non-potable water replacement

The Project scope is highly water intensive, particularly for tunnelling boring and mining. As a result, the substitution of potable water with non-potable water sources was a key consideration for GLC during early works and planning.

As a result of the consumption intensity of tunnelling activities, a consumption intensity of tunnelling activities, the reuse of treated groundwater for TBM feed supply was identified as the highest value pathway. Accordingly, the treated groundwater from the Rosehill water treatment plant was configured to supply the TBMs for both the industrial and cooling circuits. Design Stage 3 modelling estimates this initiative will amount to a 46% replacement of potable water with a non-potable supply.

In addition to the reuse of treated groundwater for tunnel boring, non-potable will be reused for dust suppression where practicable. The Design Stage 3 water modelling indicates a total 50.7% of potable water replacement on the Project, with over 440,000 kL of water expected to be used during the construction of the Project.

As of September 2023, the Project has sourced 3,508 kL of water usage from non-potable sources, with over 33,912 kL of total water consumed as illustrated in Figure 7. This split between potable and non-potable water usage is currently low at 9% non-potable water use replacement. Given the recent launch of TBMs, the non-potable water replacement rate is expected to now increase exponentially as the machines are fed entirely by recycled water.


S5-AEZ

MATERIALS

material consumption and embodied energy

Project requirements

15% reduction in materials lifecycle impacts (Scope 3) compared to a base case footprint.

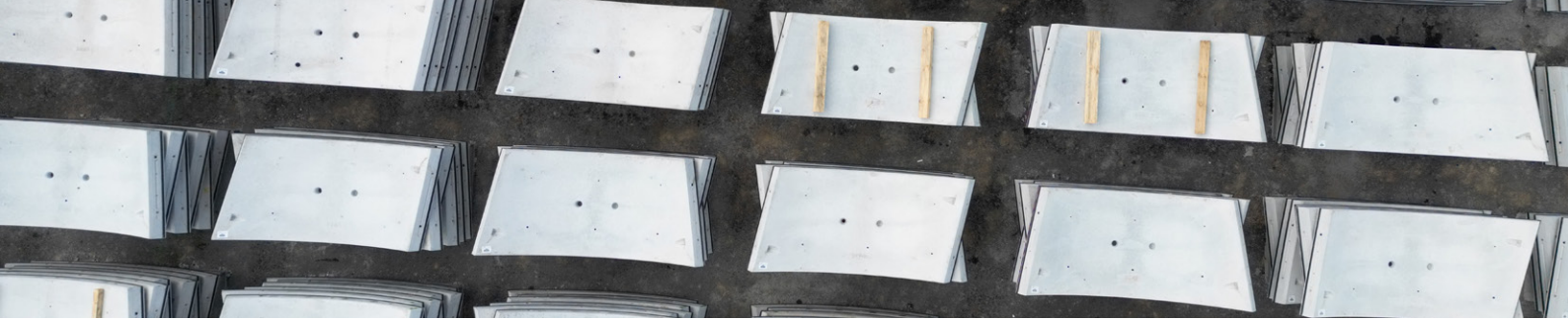
25% overall reduction in total greenhouse gas emissions (Scope 1,2 and 3) below a base case footprint.

35% Portland cement replacement in concrete with SCMs.

Performance

Concrete (cast in-situ and precast), steel, asphalt and aggregates make up the main construction materials on the Project. As the Project involves the boring of nine-kilometre mainline twin tunnels, and installation of more than 60,000 precast segments to line the tunnel, the Project is forecasted to consume upwards of 280,000 cubic metres of concrete.

Precast concrete segments are transported from Eastern Creek to Clyde to line the Sydney Metro West twin metro tunnels.

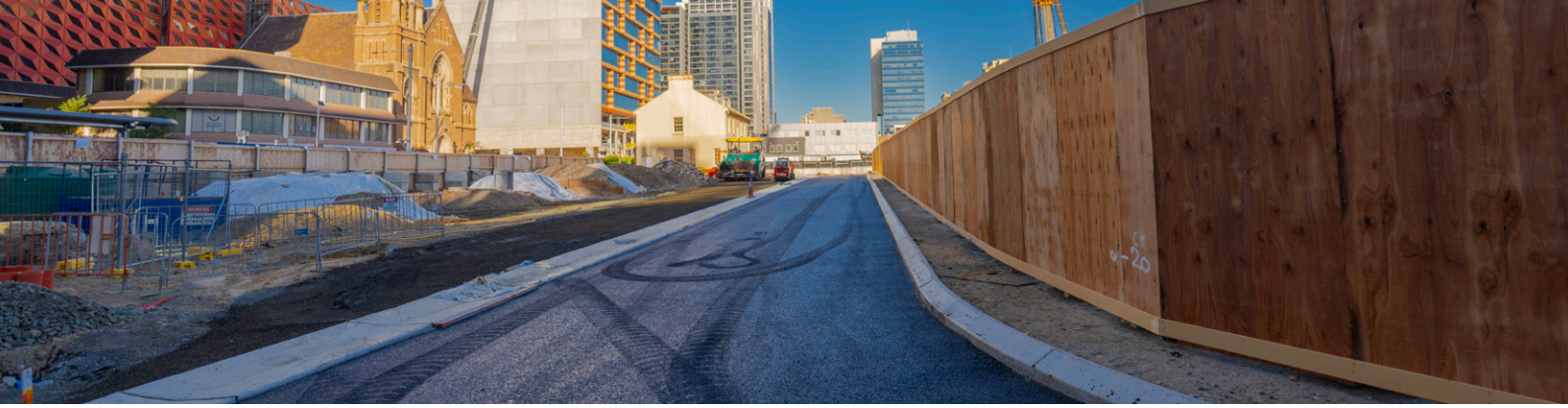


Precast concrete segments from the Project's Eastern Creek precast facility.

Modelling of expected material usage based on Design Stage 3 information indicates a 26% reduction in embodied carbon impacts when compared to a base case adjustment. The materials embodied carbon reduction initiatives identified by GLC include:

- The use of low carbon concrete mixes which incorporates a higher percentage of Supplementary Cementitious Materials (SCMs) such as fly ash and ground granulated blast-furnace slag.
- GLC successfully achieved a 50% SCM replacement of precast TBM segment mix, considered to be one of the highest in the state.
- Reduction of TBM tunnel rings thickness from 275mm to 260mm.
- The use of foam concrete in spur tunnels for backfill instead mass concrete fill (resulting in circa 40% concrete required).
- Reduction in length of the required water conveyance structure.
- Use of asphalting products with a high recycled content.

Segment production in progress at the Project's precast facility.



Reconophalt lay in progress at the Project's Parramatta metro station site.

Concrete installation in progress at the Clyde Stabling & Maintenance Facility.

As of September 2023, the Project has consumed 51,486 cubic metres of concrete as illustrated in Figure 8 and 5,649 tonnes of steel in Figure 9 construction with 87% of the steel sourced form Australian manufacturers. The forecasted SCM replacement rate based on confirmed concrete mix designs is 47%. This is an industry leading outcome for GLC and the largest contributor to the Project's reduction in total embodied carbon. To date, the SCM replacement rates are consistently tracking above the required 35% replacement as shown in Figure 10.

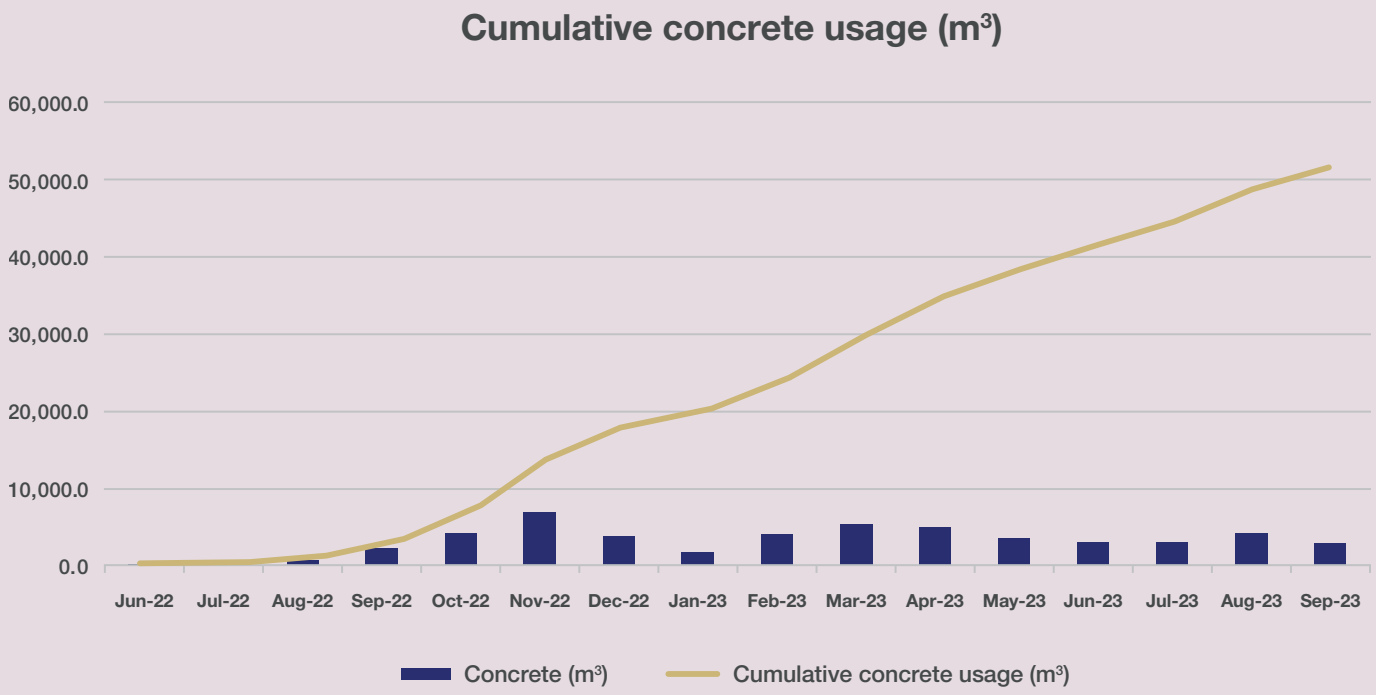


Figure 8: Cumulative concrete usage (m³).

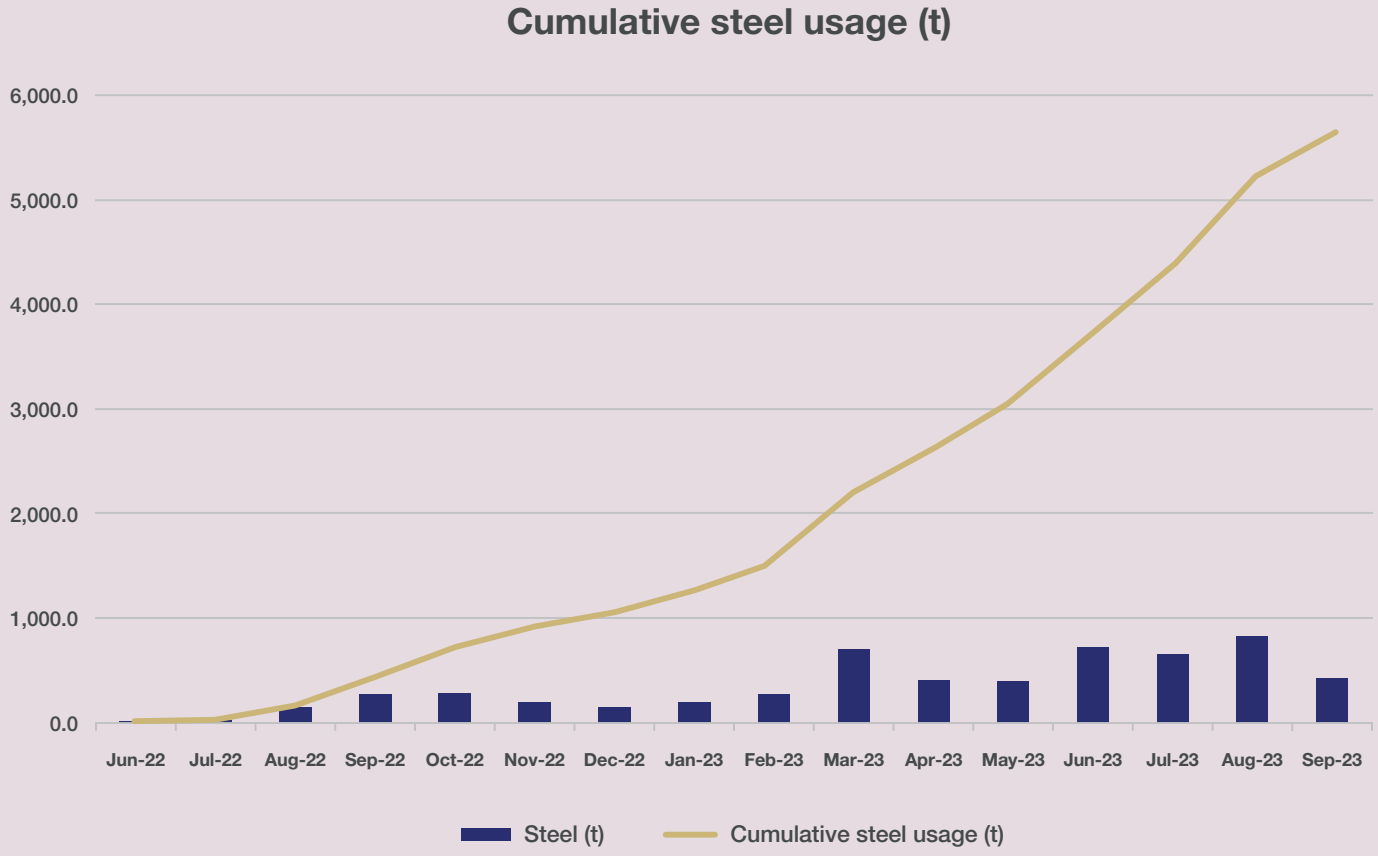


Figure 9: Cumulative steel usage (t).

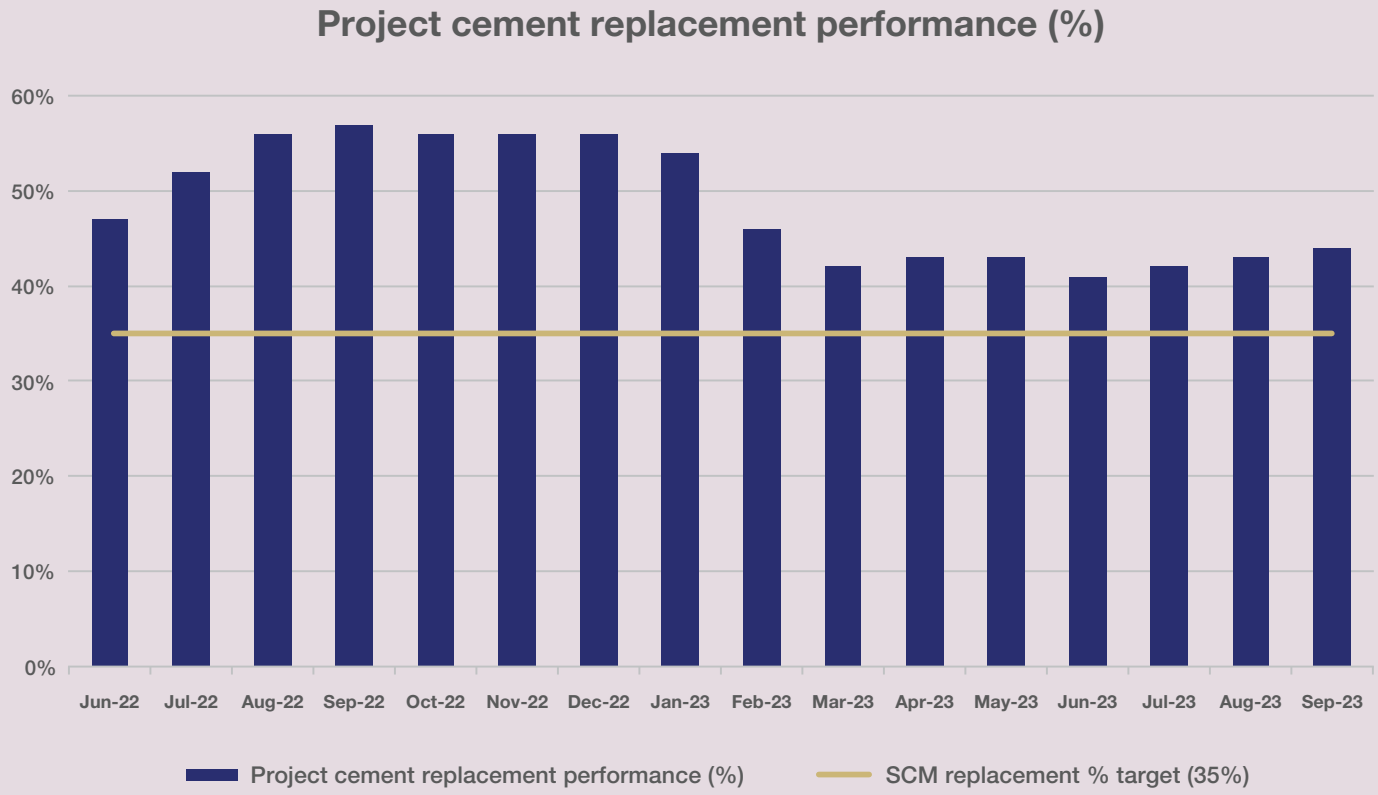


Figure 10: Project cement replacement performance (%).

WASTE

diversion from landfill

Project targets

100% of reusable spoil must be beneficially reused.

95% inert and non-hazardous construction/demolition recyclable waste (excluding spoil) must be recycled or reused.

60% recycle or reuse office waste generated during construction.

Performance

Reusable spoil

Extensive tunnelling works required for the Project will generate a significant volume of reusable material. GLC has worked closely with its consultants and the NSW Environment Protection Authority (EPA) to obtain a Resource Recovery Order and Exemption for spoil generated through tunnelling and excavation. This spoil will either be beneficially reused on-site as fill or sent off-site for beneficial reuse. More than 306,500 tonnes of reuseable spoil have been beneficially reused. The Project is expecting to generate more than two million tonnes of reusable spoil.

Excavation in progress at the Project's Clyde Dive site.

The heritage bridge built at Clyde Dive was previously a pedestrian bridge that provided access from the racecourse to the old Rosehill train station.

Construction and demolition waste

It is estimated that the Project will generate around 20,000 tonnes of construction and demolition (C&D) waste. More than 46,600 tonnes of C&D waste have been generated up to the end of September 2023 with over 99% of C&D waste diverted from landfill as shown in Figure 11.

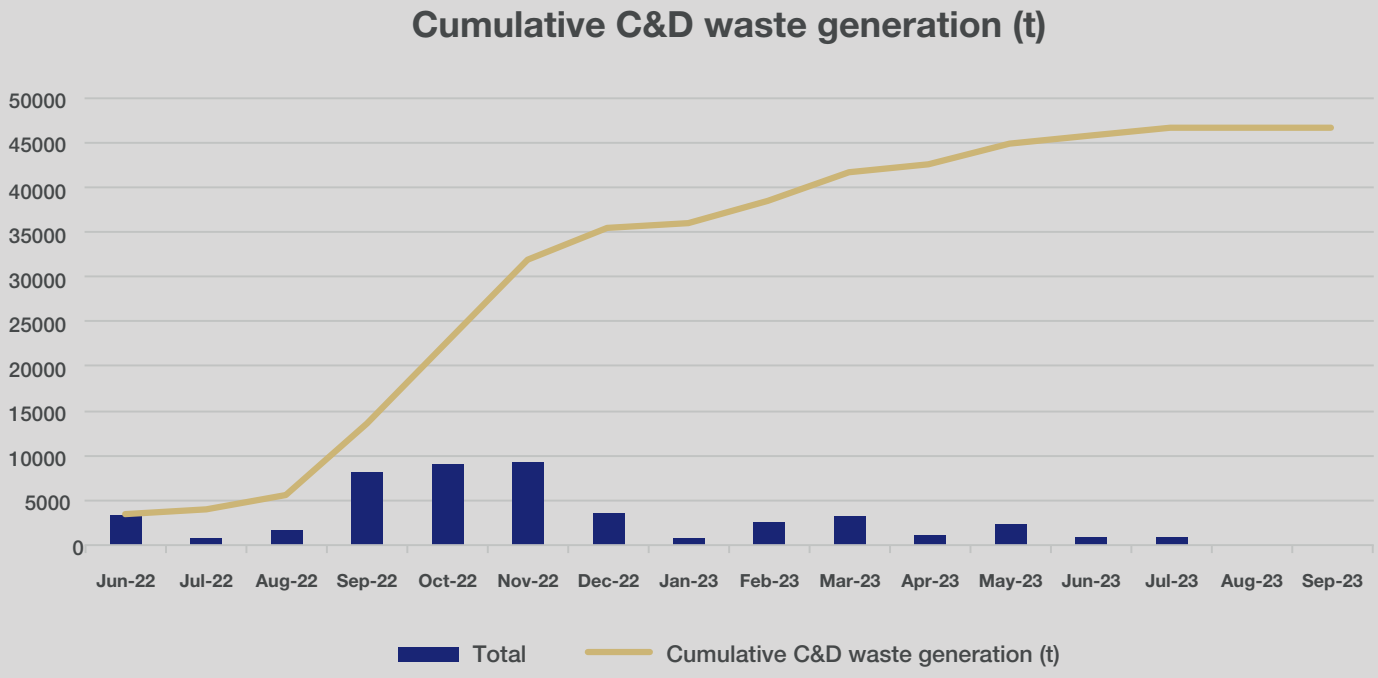


Figure 11: Cumulative C&D waste generation (t).

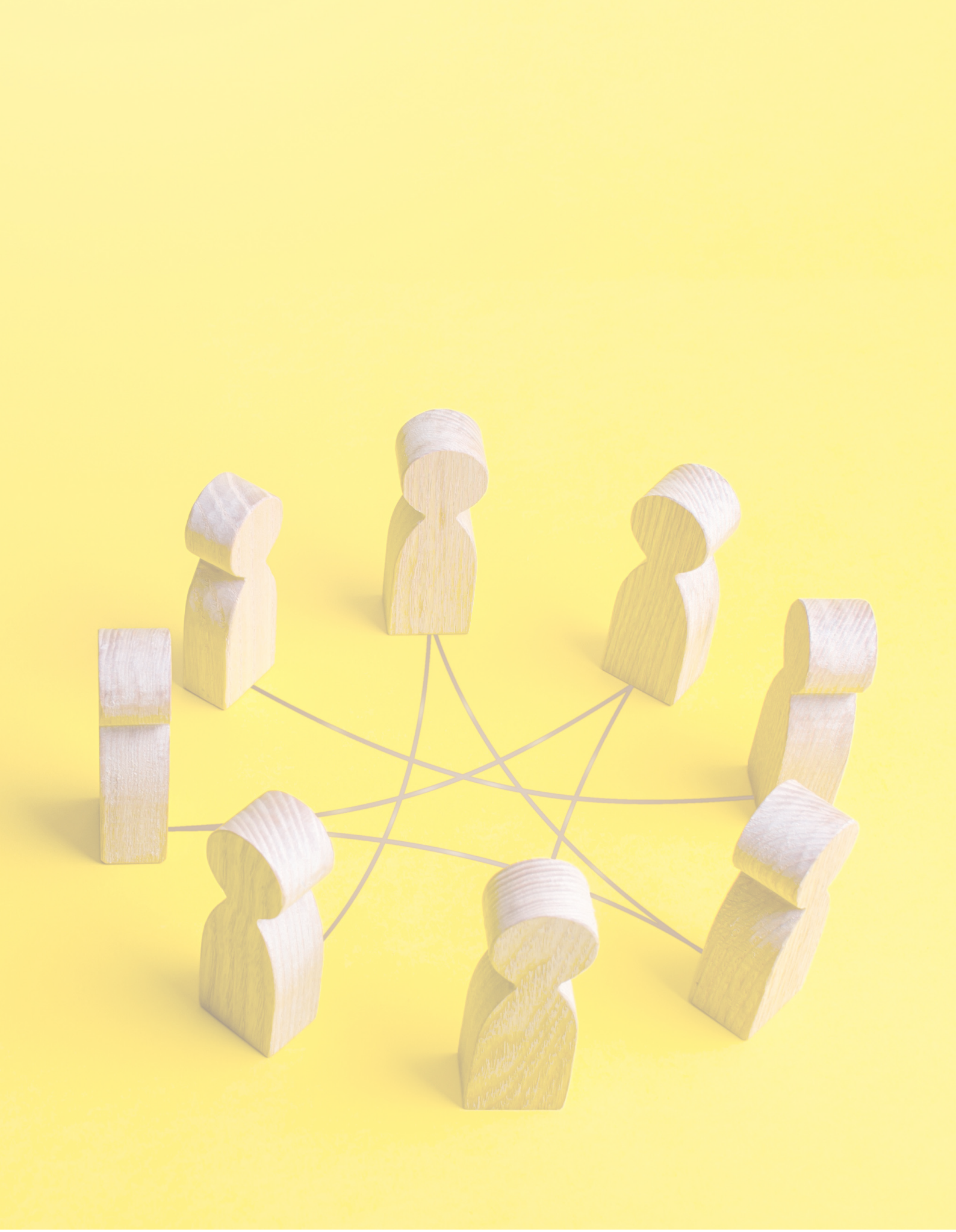
Worm farms diverting organic office waste at one of three Clyde site office gardens.

Office waste

Office waste recovery and recycling continues to be an opportunity for improvement for GLC as the diversion targets tracks consistently under the required target of 60% as detailed in Figure 12 below. GLC continues to work collaboratively with all office and site teams to raise awareness around waste segregation and recycling through a series of training sessions and investigation of adequate recycling facilities around the site offices.

Figure 12: Office waste recycling (%) performance.

Targeted PPE recycling initiative being trailed at Clyde.



INFRASTRUCTURE & SUSTAINABILITY COUNCIL (ISC)

Project targets

85 **Design and As-Built rating score of at least 85 points using the ISC IS rating tool (version 1.2).**

Performance

GLC is committed to achieving an ISC IS rating of 'Leading' in both the Design and As-Built phase with minimum target of 85 points. The submission will take place in two parts, first at the conclusion of the design phase (Design), and again at the completion of construction (As-Built). The As-Built submission will supersede the results of the Design submission.

During the early works phase, GLC completed a Weightings Assessment of the 16 categories of the ISC IS Rating Tool and committed to an aspirational target of 95.1 points (Leading rating). GLC are currently on track to submit the Project's first Design submission for verification in Q4 2023.

The key highlights of the submission are included below. As at November 2023, these ratings are yet to be verified.

Autonomous TBM

GLC is the first in Australia to build and operate autonomous TBMs, equipped with custom artificial intelligence control algorithms. Two autonomous TBMs are being used to build the nine-kilometre WTP twin metro tunnels, utilising innovative artificial intelligence software developed by Gamuda to automatically steer, operate, and monitor several essential TBM functions.

Water recycling through the autonomous TBM

TBM water feed (for both industrial use and cooling circuits) in an urban environment has historically always been potable water. GLC have worked with leading TBM manufacturer, Herrenknecht, to understand the water quality requirements and feed TBM operations with treated groundwater.

Highest SCM replacement TBM Precast Segment

In collaboration with the Project-wide concrete supplier Boral, GLC have made significant strides in the production of a high SCM precast segment mix. This has led to the development of a segment mix boosting a SCM replacement rate of 50%.

An ISC Sustainability Roadmap of planned milestones is provided in Figure 13.

Figure 11: ISC Sustainability Roadmap.

SOCIAL PROCUREMENT

driving social outcomes
through spending

Project targets

Implement procurement initiatives that support Australian and New Zealand small and medium enterprises (ANZ SMEs) and Recognised Aboriginal businesses accessing the scope of works within the supply chain.

90

Engage a minimum of 90 ANZ SMEs in the supply chain, with at least 20 of the ANZ SMEs to be recognised Aboriginal businesses.

03%

Minimum 3% spend of the contract value (Eligible Spend) to be subcontracted to recognised Aboriginal businesses.

Performance

Incorporating social procurement in infrastructure projects creates additional social value beyond the procurement of goods, services, or construction. GLC focuses on maximising social procurement through the following:

- The Project has made significant investments in engaging recognised Aboriginal businesses and subcontractors, and proud to have achieved the target of minimum 3% contract value spend in September 2023.
- So far, over 100 ANZ SMEs have been engaged in the supply chain.
- GLC are proud to have directly engaged 20 Aboriginal businesses as at September 2023. In addition to this, GLC's subcontractors have engaged an additional ten Aboriginal businesses who are also working on WTP

The Yarning Circle artwork was created by Leah Murphy, a young Gamilaroi girl born and raised on Dharug land. The artwork represents the Tunnelling & Infrastructure Academy in the form of a yarning circle - an ancient tradition where Aboriginal people would share stories, trade goods, practice ceremony, and also a place were important conversations were held and decisions were made.

GLC team members alongside ex-Olympian Dan Collins at the GLC Subcontractor Forum hosted in November 2023. GLC collaborated with Aboriginal artist Luke Penrith to develop GLC PPE, including Aboriginal Art on the GLC long-sleeved PPE shirts.

Brian Dowd, founder of Walkabout Barber, presented to over 90 Project delivery partners at the GLC Subcontractor Forum in November 2023.

STAKEHOLDER ENGAGEMENT

active and transparent engagement with all impacted stakeholders

Performance

The following is a summary of the performance of stakeholder engagement actions undertaken from June 2022 to September 2023:

- Circa 300,000 community engagements have been undertaken during this period.
- Ten community information sessions were held, with 100% of stakeholders who attended the events satisfied with how they have been informed about the Project's work activities. Regular monthly construction notifications were delivered to circa 4,000 stakeholders each month.
- Biannual community newsletters have been issued to the community surrounding the Project's Parramatta, Westmead, and Clyde sites.
- Five community benefit initiatives were conducted, which included donations to various organisations and education for children on road safety awareness.
- The community has been kept informed about construction activities through various activities including community notifications, doorknocks, and communication via closed loop means such as inquiries and complaint management.
- A Heritage Open Day event was hosted at the Project's Parramatta site, with 294 attendees at the event who visited the site to learn more about the archaeological remains and history of Parramatta.
- Biannual Subcontractor Forums have been hosted by GLC. Key delivery partners attend these forums to learn more about the Project's progress, requirements, and to engage and network.

A Community Information Session in progress at the Project's Westmead site.

GLC and delivery partner, Boral, visited Westmead Public School during National Road Safety Week in 2023 to educate school children about the importance of truck blind spot awareness.

Sydney Metro's archaeology team spoke with over 350 community members about the archaeological investigations taking place at Parramatta at the Heritage Day, held in July 2023.

WORKFORCE SKILLS AND DEVELOPMENT

engagement and retention of a diverse, skilled, and sustainable workforce

Project targets

20 apprentices.

15 graduate placements.

15 work experience placements.

03 initiatives that will provide tangible benefits to local employment and retention.

Project targets

02% minimum of under-represented groups (returned servicemen, refugees and asylum seekers, long term unemployed, underemployed).

10% At least 10% of local sustainable workforce across the supply chain to include trainees (where traineeship qualifications are available).

Deliver a structured mentoring and support program that would increase retention of diversity groups.

Performance

State significant infrastructure projects possess the capability to improve the skill set and capacity of the workforce, alleviate shortages in skills, and foster sustainable local employment. GLC concentrates on realising these objectives through a range of initiatives, including training, apprenticeship programs, and traineeships.

The Project's Tunnelling & Infrastructure Academy (TIA) at Clyde is the first custom designed, purpose-built learning facility in NSW, and only the second in Australia. The TIA will specialise in the delivery of training activities across both civil construction and tunnelling disciplines. The aim of the training facility is to upskill both new and existing workers, providing them with an opportunity to participate in training programs that will help boost their knowledge and capability, whilst also building the tunnelling industry talent pipeline.

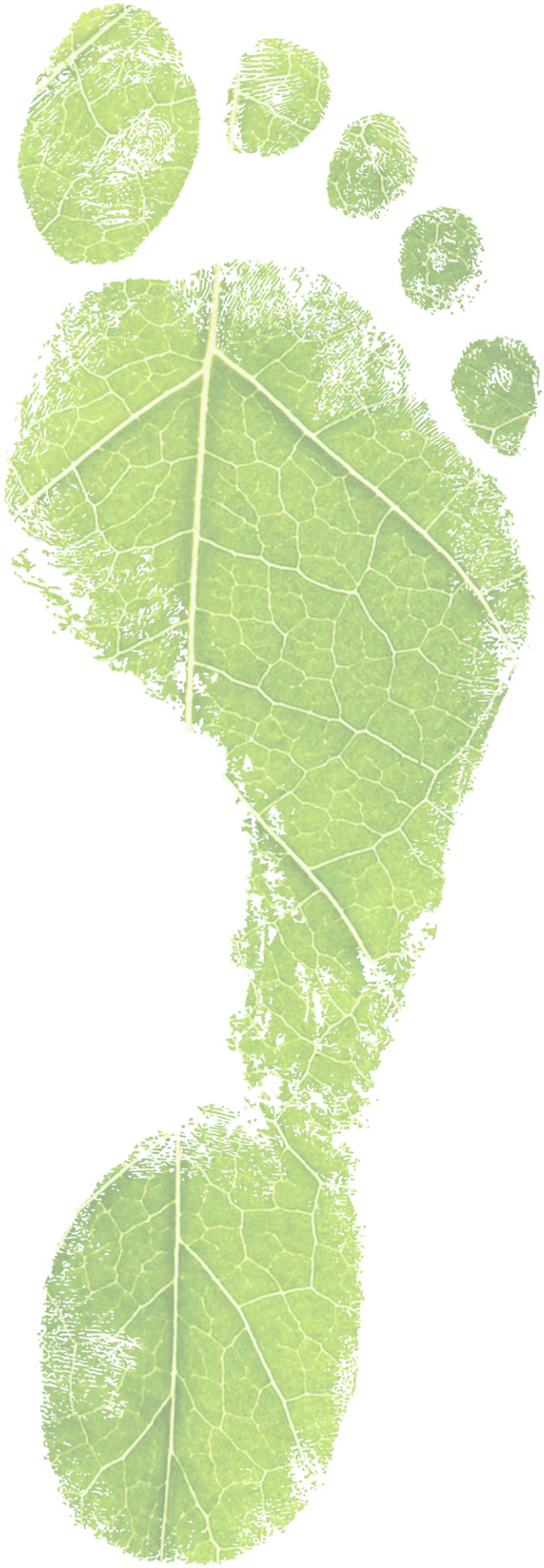
Gamuda are the first contractor in Australia to offer nationally accredited units of competency in tunnel boring operations, which align directly to the Australian Qualification Framework.

Moreover, the Project emphasises inclusivity by offering job opportunities, support for retaining positions, and training for skill development aimed at Aboriginal individuals and women pursuing non-traditional roles.

GLC has employed the below demographics as of the end of September 2023:

- 2,966 Greater Western Sydney residents
- 156 apprentices
- 31 graduate placements
- 31 work experience placements
- 250 women in non-traditional trades and occupations
- 209 Aboriginal Peoples Participation in the workforce
- 16.7% under-represented groups (returned servicemen, refugees and asylum seekers, long term unemployed, underemployed).

GLC has been actively promoting gender diversity in the tunnelling industry through its **Women Who Work in Tunnelling** initiative. GLC has collaborated with Empowered Women in Trades to co-design the six-week mentoring and coaching program for fifteen women who will be joining the workforce after completing Women in Tunnelling Pre-Employment Program (PEP). Currently, there are 174 individuals enrolled in a CERT III or higher qualification program in skill shortage areas identified by GLC.



OPPORTUNITIES FOR IMPROVEMENT

Construction in progress at the Project's Westmead site.

What has worked well on the Project?

- Early engagement with the Design team led to robust Sustainability in Design processes where multiple initiatives to reduce resource consumption (energy, water, materials) were identified and implemented to significantly reduce the GLC's resource consumption.
- Sustainability related requirements focussing on ISC deliverables were embedded in management systems and management plans early in the planning phase, resulting in a streamlined tracking process.
- An industry-leading material compliance review process for construction materials has been implemented on the Project. This process requires sign-off by multiple disciplines ensuring that all contract related requirements are met.
- Parramatta is a place of extraordinary history, and as a result, GLC have made significant steps to ensure that this has been celebrated. GLC facilitated a public Heritage Open Day to enhance local heritage values on Saturday 29 July 2023. A total of 294 individuals, made up of 149 parties, attended the Open Day celebration. Twenty-five percent of attendees completed a post-event survey, with 100% of respondents very satisfied or satisfied with the event, 100% were likely to tell a friend about the event, and 100% of respondents likely to attend a GLC event in the future.
- In collaboration with the Department of Education and Training, Gamuda developed and introduced (to the broader industry) the very first nationally accredited training package in Tunnel Boring Machine Operations. The Unit of Competency (UoC) is called RIICTC306 Conduct TBM Operations. Additionally, Gamuda developed two tunnelling UoCs, which have all been made available to other contractors within industry.

What has not worked so well on the Project?

- Office waste diversion has consistently failed to meet the 60% diversion from landfill rate.
- Procurement documentation was developed early to include for at least 20% non-financial scoring criteria of tenderers, but the framework has not been applied uniformly as intended.
- Sustainability training was developed for high-impact suppliers, but uptake to date has been poor.
- Community Benefit initiatives have been identified; however the evaluation and implementation process has been slow. An additional 14 initiatives are required to be implemented prior to Practical Completion.

Opportunities for improvement for 2024-2025

- Increase awareness and engagement around the identification and approval of community benefit initiatives.
- Foster a robust recycling culture in site offices across the Project to improve GLC's office waste to landfill rates.
- Review the implementation of remaining high-impact procurement practices to ensure the packages are being evaluated and awarded appropriately.
- Review and manage the sustainability performance of high-Impact suppliers and subcontractors for the remainder of construction and identify any opportunities for improvement.
- Develop case studies to highlight GLC's collective achievements, including cost benefit analysis based on as-built construction wherever possible.
- Some of the equipment within the training facility could benefit from having distinct, specific training directly aligned to the Australian Qualification Framework – for example, the conveyor belt. At present, this is used for the AQF unit of competency called 'RIICTC306E Conduct TBM Operations.' Gamuda has identified that this piece of equipment could benefit from having a training package built, developed, and facilitated independently from the TBM curriculum.
- New learning packages (such as the introduction of micro-credentials) coupled with expanding partnerships (e.g. universities, Australasian Tunnelling Society) have the potential to bring new and innovative learning solutions into the TIA.

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