SBEnrc Project Progress – Quarterly Report
01 Apr to 30 Jun 2026

Project Number & Title	2.11.2 Improving Productivity, Carbon and Resilience Through Interoperable Built Environment Data
PSG Chair	Andrew Curthoys
Project Leader	Peng Wu, Curtin University

Overall Project Health and Delivery	Major issues or delays	☐	Minor issues or delays	☐	Progressing as planned	☒

Comments on project health/delivery:
The project is progressing as per planned milestones and deliverables.

Progress against milestones/deliverables:

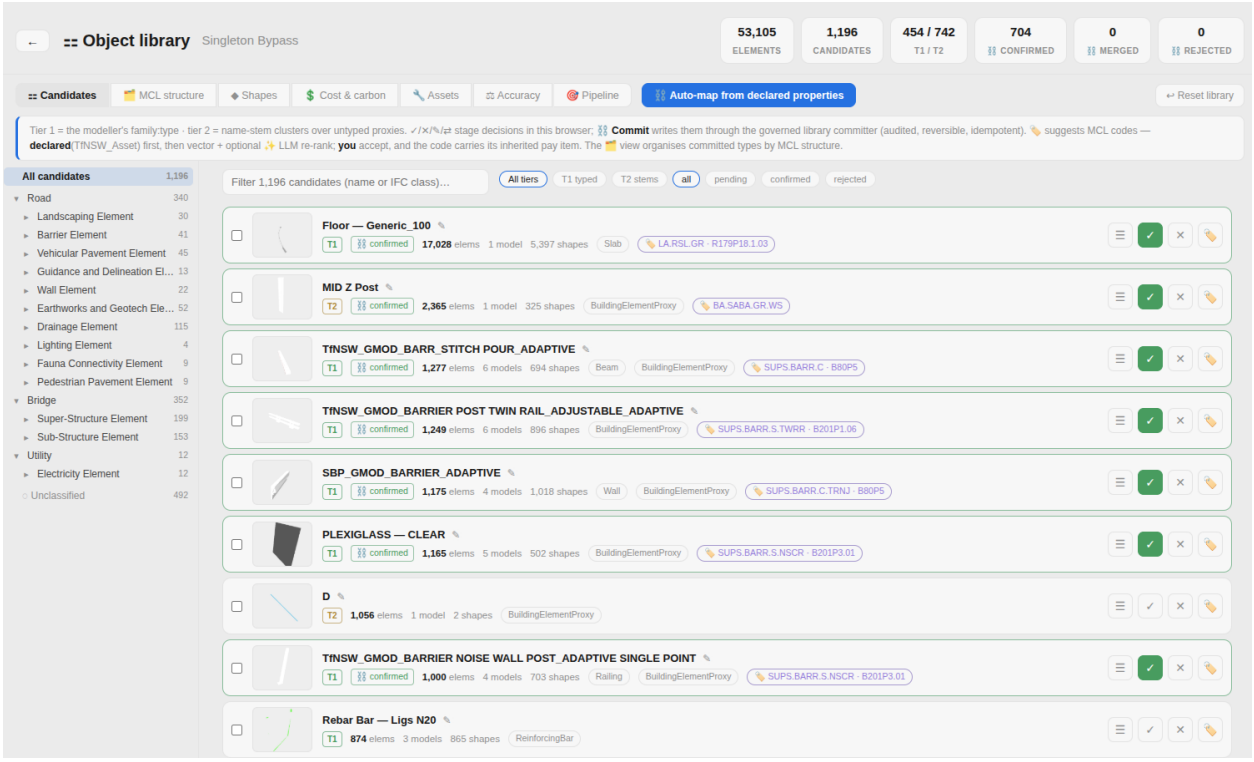
No.	Description	Milestone or Deliverable?	Planned Due Date	Completion/ Forecast Date
1	Project Commencement and PSG #1	Milestone	05/05/2026	Completed
2	PSG #2 and Quarterly Report 1	Milestone	03/08/2026	In Progress
3	Research report on unified data framework	Deliverable	19/10/2026	
4	PSG #3 – Half Year Review, Quarterly Report 2 and Industry Partner Engagement Sessions (Case Studies/Briefings) as agreed by CEO	Milestone	19/10/2026	
5	Preliminary results - Case studies	Milestone	08/12/2026	
6	PSG #4 – Quarterly Report 3	Milestone	08/02/2027	
7	Interim results - Case studies	Milestone	10/04/2027	
8	PSG #5 – Half Year Review, Quarterly Report 4 including Industry Dissemination Outputs (Project Website) and Skills Development/Knowledge Transfer/Industry Adoption Plan (Item 2.6) as agreed by CEO	Milestone	10/05/2027	
9	Draft Industry Report/Case Study Report	Deliverable	09/08/2027	
10	PSG #6 (Final) – Quarterly Report 5 and Final Industry Report and Communications package (includes draft YouTube video and graphically designed and technically reviewed 16-24 page industry report)	Milestone	09/08/2027	
11	Skills development/research into practice	Deliverable	30/09/2027	
12	Project Completion – Final Industry Report and Video	Deliverable	30/09/2027	
13	Uptake and Impact Report	Milestone (financial)	30/09/2027	

Progress <u>this quarter</u>:

Case study 1: TfNSW Infrastructure Common Data Model

We have ingested the TfNSW standards suite into the platform as structured, versioned reference data including: MCL, Pay Item, ECCL, and ACS. On the model side, we validated the approach on a real case project

(Singleton Bypass, a BIM model federation of ~53,000 elements): the platform mines the models into a governed object library — 704 object types covering 45,900 elements (86%) — and classifies each type against the standards through a unified pipeline. Where the design models declare TfNSW asset codes in their properties, classification is automatic and near-complete (the MCL mapping reached 100% of library types, ~91% of it from declared codes); the remainder is proposed by a configurable multi-signal engine (name matching, semantic similarity, geometry shape, spatial/graph context, and cross-standard inference that learns as classifications are confirmed) and always confirmed by a human. Every classification is a governed, audited, reversible commit, and MCL, Pay Item and ACS stay synchronised because they are views of one classification record per object type. Because each object type carries its MCL entry, its inherited (and overridable) pay item, and the ECCL benchmark behind it, the platform computes cost and staged embodied carbon directly from model quantities: geometry-derived volumes, areas, lengths and counts, matched to each pay item's unit of measure. Future work will focus on resolving the unit-basis mismatches identified by the accuracy audit — cases where a pay item's unit of measure does not match the modelled geometry, such as per-metre items measured from point objects (e.g. barrier posts standing in for a rail run) or per-each items spanning a wide size range.



Case study 2: SCC 12d model case study

We have successfully ingested the three IFC models supplied by Sunshine Coast Council (Packages A, B and C, exported from 12d Model in IFC4 format) into our platform — approximately 197,000 elements in total.

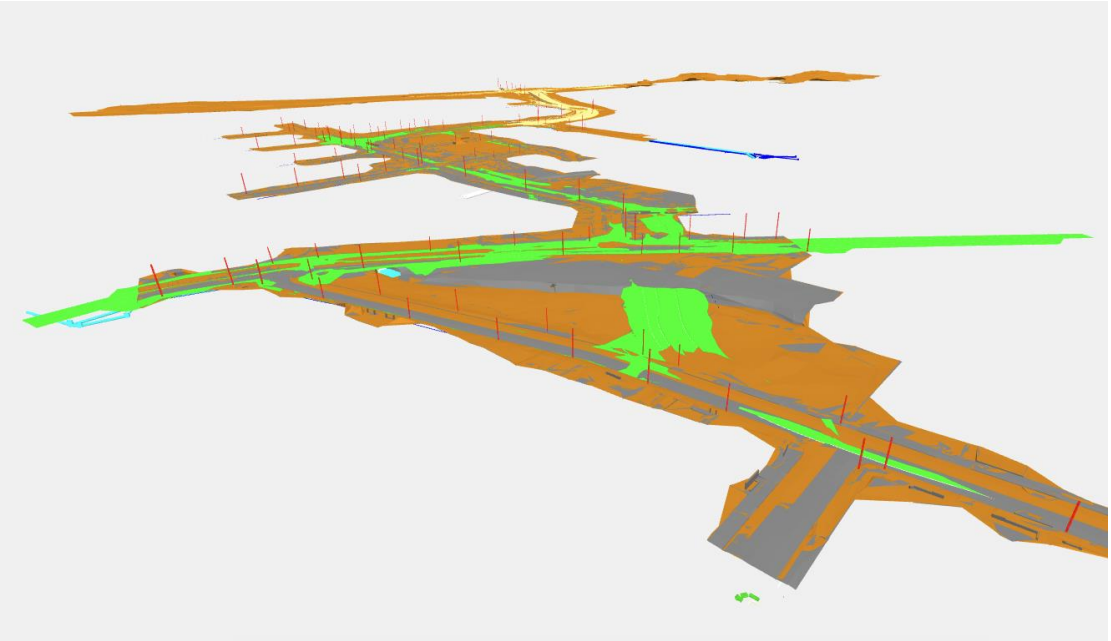
The models are well-structured: units and coordinates are consistent (MGA94 Zone 56), the 12d model/layer organisation is preserved, and around 6,600 asset elements carry ADAC attribution (trees, pipes, pits, maintenance holes, pathways, road islands and similar), which we have connected to the published ADAC Asset Data Dictionary v6.0.0 so that assets can be browsed, validated and classified directly against the council's standard.

Packages A and B are geometry-rich (roughly half to two-thirds of elements carry solid geometry, from which we compute true quantities); Package C is predominantly underground services, where the pipe networks carry geometry and the remainder is survey/design linework.

Embodied carbon is calculated as material × quantity × emission factor, using a public dataset such as the NABERS national material emission factors. Quantities we can largely derive ourselves — from solid geometry, and from ADAC dimensions (pipe diameters, pathway widths/depths) for linear assets. The decisive gap is material identity: the 12d exports carry no IFC material assignments, and ADAC material

values (Concrete, RCP, DI, PVC-U, etc.) cover only the ~4,000 attributed asset elements — the bulk of the carbon-carrying volume (kerbs, pavements, retaining structures, footings) currently has no material recorded. Our next step is to build the project's object library so materials can be assigned and reviewed efficiently at the object-type level rather than per element, then connect the NABERS factors.

To sharpen the results, we would ask the council for: material or specification references for the main design elements (or the relevant standard drawings), typical reinforcement rates for in-situ concrete elements, and confirmation of which package should be treated as authoritative where the survey base is repeated across the three files, so shared content is not double-counted.



We have also been in contact with Tony Ingold from 12d Model. 12d Model has agreed to provide us with an educational licence. We are working with Tony on the purchase.

Case study 3: Automatic carbon accounting using MetaBIM

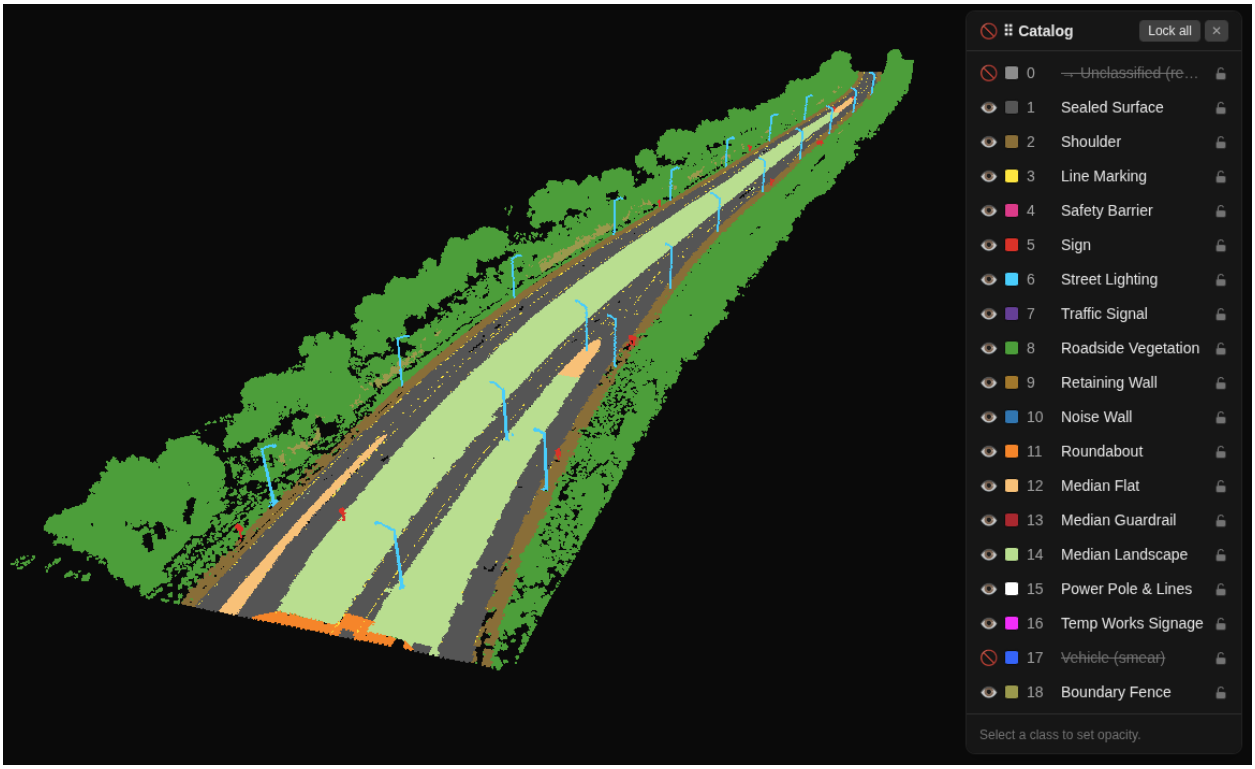
The team has been working on refining some of the calculation processes in MetaBIM and will liaise with John for a demonstration once this is completed.

Case study 4: MRWA LiDAR

We have developed a deterministic, corridor-aware point-cloud classification pipeline that assigns each LiDAR return to one of 18 asset classes (MRWA's 14 categories plus four extensions).

Discrete roadside assets are now classified reliably: street lighting and road signs are detected accurately, and safety barriers, boundary fences, vehicles, and power poles reproduce consistently across segments. The most significant recent improvement is to the road-surface classes — sealed surface, shoulder, median flat, and median landscape — which were previously the main source of error.

We replaced a fragile trajectory-based median model with a geometric cross-section model that defines the median as the region enclosed by the driven carriageway and distinguishes a paved (flat) median from a vegetated (landscape) median by its surface colour and continuity. Validated against manually-corrected ground truth on segment 0001 (with the inherently-fuzzy plane boundaries excluded from scoring), this raised median detection recall from 0.35 to 0.76 at 0.96 precision; the flat-vs-landscape split is 0.97/0.98, shoulder identification is 1.00, and roadside vegetation is now correctly confined to the road's outer edge (0.96) rather than bleeding into the median. Overall the amount of manual correction required on a segment has dropped substantially.



Case study 5: Atlas mobile laser scanning in quality assurance

The team visited Atlas on 2 July and have obtained a basic understanding of the production process of precast panels in Atlas. We have discussed with Karim about data requirement for us to work on a standardised process to use mobile laser scanner to conduct automatic quality assurance/check.

The quality check indicators may include:
Dimensional: length, width, thickness, edge straightness and skew.
Shape/form: surface flatness, warping and bowing, and local smoothness.
Openings and features: window/door opening dimensions and positions relative to panel edges, etc.
Embedded elements: positions of embedded elements including rebars, etc. rebar position, cast-in lifting anchors positions, etc.
Surface condition: honeycombing, spalling, cracks (width/length), air voids/bugholes above spec.

These data requirements include:

1. Panel type: The nominated standard or main product panel, including the panel mark and a brief description.
2. Tekla model: The detailed model for the panel, either in the native format or as an IFC4 export, including reinforcement, grout tubes and cast-in items.
3. Shop drawing: The corresponding current-revision drawing in PDF format.
4. QC records: Two or three completed inspection checklists for this panel type, covering both pre-pour and post-demould inspections.
5. Tolerances: The tolerance values applied to each inspection item, or the relevant clauses from the applicable standards or project specifications.
6. Site photos: A few photographs of the casting bed and the surrounding production area where this panel is manufactured.

The team will be in touch with Karim for a follow up site visit with our mobile laser scanner.

Project outputs and communications <u>to date</u>:

- The Communications matrix is being populated with opportunities for dissemination pathways as the project evolves.