

**Digital Twin
Victoria**

Shaping
our digital
future



eComply Framework BIM Drafting Guidelines

V1.1 – December 2023



Department
of Transport
and Planning

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Background & Purpose

1.1 About eComply

Digital Twin Victoria in partnership with Australian start-up Archistar have delivered digital assessment technology designed to enable builders, building designers to test their 3D building designs against planning codes, making building compliance easier and faster for everyone in the process.

After industry trials and the release of the first commercial solution Digital Twin Victoria has developed an open framework aiming to encourage the adoption of digital building processes and the growth of digital assessment tools.

The framework presents data specifications and computational methodologies to assess building compliance for Victoria's Small Lot Housing Code. The framework can be used by those developing digital solutions, offering data services, or those trying to understand how eComply solutions function.

eComply is one piece of the [Digital Twin Victoria program](#), an investment by the Victorian Government in digital twin technology and spatial innovation to help revolutionise how we plan and manage our built and natural environments.

1.2 Document Purpose

The purpose of the eComply BIM Drafting Guidelines is communicate common drafting techniques necessary for eComply building assessment. The audiences of this document include:

- BIM Managers within building design organisations considering the adoption of eComply
- Land surveyors modelling neighbourhood houses for the development site context.
- Computational designers developing eComply assessments.

For day-to-day use of eComply users should preference the documentation provided by the solution vendor as this document will not cover BIM software specific guidance i.e., importing classification templates or IFC export processes.

1.3 Applying the Guideline

The guideline may be used to inform organisation's drafting standards or the development of commercial eComply solutions. Designers may test their BIM models within the eComply [demonstration site](#).

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1.4 Companion Documents

The eComply Framework consist of the following documents:

ID	Document	Description
1	BIM Drafting Guidelines (This Document)	Guidelines for building designers to model 3D building information supporting eComply building compliance assessment.
2	Site Context Guidelines	Guidelines for land surveyors to provider site context datasets – the 'digital twin' of the development site.
3	Assessment Practice Note	Computational practices to analyse and assess building compliance against residential design standards

2. BIM drafting for eComply

2.1 General Data Specifications

2.1.1 File Formats

eComply solutions must only accept IFC BIM file formats. Supported IFC versions include:

- 4.x (preferred), or
- 2x3 where solutions can handle geolocation in alternative means.

2.1.2 Object Classification

Models assessed leverage IFC object classification schemes and a specific parameter structure. See **Feature Classification** section.

2.1.3 Geometric Level of Detail (LOD)

Residential design standards include site layout, massing, and amenity impacts. The level of detail of geometric drafting should meet the LOD 200 level as per the following definition:

The BIMForum 2020 LOD specification defines and interprets LOD 200 as:

The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element. At this LOD elements are generic placeholders. They may be recognizable as the components they represent, or they may be volumes for space reservation. Any information derived from LOD 200 elements must be considered approximate.

Models include the representation of site access, fences, decks, carports, facades (including walls, windows, balconies, and balusters), roofs (including fascia, eaves, soffits, gutters, chimneys, flues and skylights), floors, stairs, internal partitions, porches or pergolas, areas and rooms that identify spaces, water/fuel tanks and any exterior heating/cooling equipment.

Specific modelling techniques are described in the section **Modelling Methodologies**

Note: Models being loaded into eComply solutions as existing built structures need only externally facing architectural features with private open space and habitable windows specially labelled.

2.1.4 Geolocation

Any georeferencing must use Geocentric Datum of Australia 2020 (GDA2020). Either referenced as GDA2020 (Latitudes and Longitudes) or as MGA2020 projection coordinates (Easting, Northing and Zone). eComply solutions define the appropriate coordinate system for the site being assessed.

Heights provided in the Australian Height Datum (AHD).

eComply solutions must support the management of georeferenced land lot datasets and include the ability to extract a georeferenced lot boundary to allow the model designer to 'site' their model onto to georeferenced land lot. See **Siting** section for more information.

2.2 Feature Classification

eComply uses an IFC classification and parameter system for the exchange of architectural information. The classifications system defines the type of architectural feature, and usage of the feature or space relevant to the assessment of residential design standards.

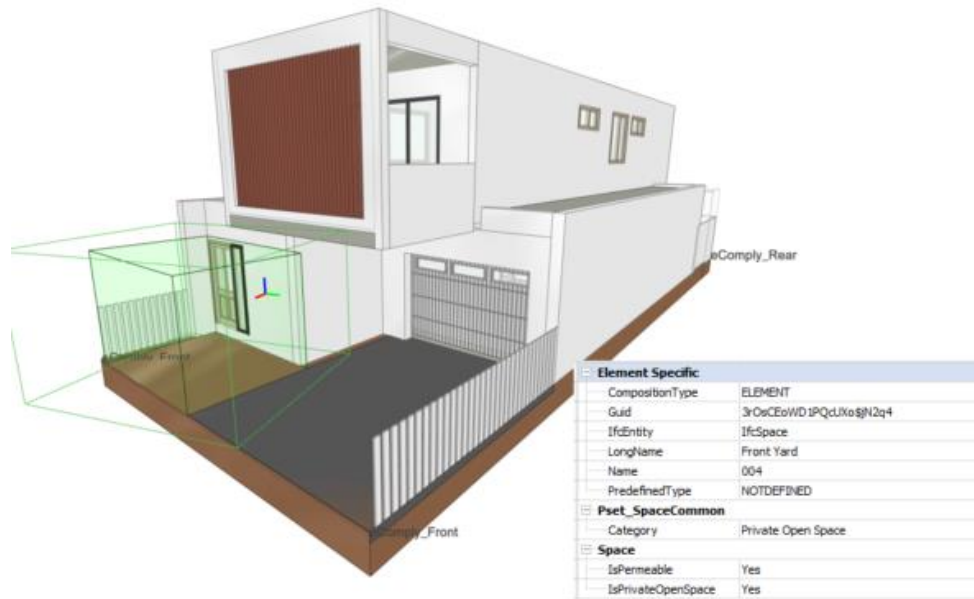


Figure 1 – An IFC format house design demonstrating a space tagged as a ‘Private Open Space’

eComply solutions provide the eComply classification and parameter structure as a template to be imported into BIM software.

2.2.1 IFC Mappings

Construction features are represented by the following classification scheme. Duplicate mappings exist to support a range of levels of geometric detail. See **Modelling techniques** for further information.

Construction Object	IFC Class Name	IfcPredefinedType
Awning	IfcShadingDevice	AWNING
Balcony (Slab)	IfcSlab	
Balcony	IfcSpace	
Beams	IfcBeam	BEAM or JOIST
Chimney	IfcChimney	
Columns	IfcColumn	COLUMN
Cooler	IfcChiller	
Curtain Wall	IfcCurtainWall	
Deep Planting Soil	IfcSite	
Deep Planting Soil	IfcSlab	
Deep Soil	IfcSite	
Door	IfcDoor	DOOR
Eave	IfcCovering	
Eave	IfcRoof	
Eave	IfcSlab	
Exterior Wall	IfcWall	SOLIDWALL
Exterior Wall	IfcWall	PARTITIONING
Fascia	IfcCovering	
Fascia	IfcRoof	
Fascia	IfcSlab	

Construction Object	IFC Class Name	IfcPredefinedType
Fence	IfcRailing	BALUSTRADE
Fin / Nib	IfcWall	
Flat Skylight	IfcWindow	LIGHTDOME
Gate	IfcDoor	GATE
Gutter	IfcFlowSegment	GUTTER (Custom)
Heater	IfcSpaceHeater	
Internal Partitions	IfcWall	
Jalousie	IfcShadingDevice	JALOUSIE
Landing	IfcSlab	LANDING
Level	IfcBuildingStory	
Pad	IfcSlab	BASESLAB
Parking Space	IfcSpace	
Pergola	IfcSpace	
Permeable Space	IfcSpace	
Porch	IfcSpace	
Private Open Space	IfcSpace	
Property Boundary	IfcSpace	
Ramp	IfcRamp	
Roof	IfcRoof	
Rooms	IfcSpace	
Shade sail	IfcShadingDevice	AWNING
Shutter	IfcShadingDevice	SHUTTER
Site	IfcSite	
Sloped Skylight	IfcWindow	SKYLIGHT
Soffit	IfcCovering	CEILING
Stairs	IfcStairs	
Step	IfcStair	
Sunhood	IfcRoof	
Sunhood	IfcShadingDevice	SUNHOOD (Custom)
Sunhood	IfcSlab	
Sunshade	IfcRoof	
Sunshade	IfcShadingDevice	SUNSHADE
Sunshade	IfcSlab	
Tank	IfcTank	
Topography	IfcSite	
Verandah	IfcSpace	
Window	IfcWindow	WINDOW

2.2.2 Parameters

Parameters extend the IFC classification to support the assessment of residential design standards concepts. For example, the usage of spaces. They also allow for secondary classifications of generic objects as supported by LOD 200.

IFC Class Name	Parameter	Description	Value
IfcCovering	IsEave	Covering object represents 'Eave'	Boolean Y/N
IfcCovering	IsFascia	Covering object represents 'Fascia'	Boolean Y/N
IfcDoor	HasWindow	Door object features a 'Window'	Boolean Y/N
IfcDoor	IsEntrance	Door usage is 'Entrance'	Boolean Y/N
IfcDoor	IsGarage	Door connects to 'Garage'	Boolean Y/N
IfcDoor	IsHabitable	Door connects to 'Habitable' space	Boolean Y/N
IfcRailing	IsFence	Railing object represents 'Fence'	Boolean Y/N
IfcRoof	IsEave	Roof object represents 'Eave'	Boolean Y/N
IfcRoof	IsFascia	Roof object represents 'Fascia'	Boolean Y/N
IfcRoof	IsSunhood	Roof object represents 'Sunhood'	Boolean Y/N
IfcRoof	IsSunShade	Roof object represents 'Sunshade'	Boolean Y/N
IfcShadingDevice	IsSunhood	Space usage is 'Sunhood'	Boolean Y/N
IfcShadingDevice	IsSunShade	Space usage is 'Sunshade'	Boolean Y/N
IfcSite	IsDeepSoil	Site object represents 'Deep soil planting'	Boolean Y/N
IfcSlab	IsDeepSoil	Slab object represents 'Deep soil planting'	Boolean Y/N
IfcSlab	IsEave	Slab object represents 'Eave'	Boolean Y/N
IfcSlab	IsFascia	Slab object represents 'Fascia'	Boolean Y/N
IfcSlab	IsSunhood	Slab object represents 'Sunhood'	Boolean Y/N
IfcSlab	IsSunShade	Slab object represents 'Sunshade'	Boolean Y/N
IfcSpace	IsBalcony	Space usage is 'Balcony'	Boolean Y/N
IfcSpace	IsBedroom	Space usage is 'Bedroom'	Boolean Y/N
IfcSpace	IsBicycleStorage	Space usage is 'Bicycle Storage'	Boolean Y/N
IfcSpace	IsCarport	Space usage is 'Carport'	Boolean Y/N
IfcSpace	IsDeck	Space usage is 'Deck'	Boolean Y/N
IfcSpace	IsGarage	Space usage is 'Garage'	Boolean Y/N
IfcSpace	IsHabitable	Space usage is 'Habitable'	Boolean Y/N

IFC Class Name	Parameter	Description	Value
IfcSpace	IsLanding	Space represents a 'Landing'	Boolean Y/N
IfcSpace	IsLivingRoom	Space usage is 'Living Room'	Boolean Y/N
IfcSpace	IsParkingSpace	Space usage is 'Carparking Space'	Boolean Y/N
IfcSpace	IsPergola	Space usage is 'Wardrobe'	Boolean Y/N
IfcSpace	IsPermeable	Space usage is 'Water Permeable'	Boolean Y/N
IfcSpace	IsPorch	Space usage is 'Porch'	Boolean Y/N
IfcSpace	IsPrivateOpenSpace	Space usage is 'Secluded Private Open Space'	Boolean Y/N
IfcSpace	IsStorage	Space usage is 'General Storage'	Boolean Y/N
IfcSpace	IsVerandah	Space usage is 'Verandah'	Boolean Y/N
IfcSpace	IsWardrobe	Space usage is 'Wardrobe'	Boolean Y/N
IfcWall	IsFence	Wall object represents 'Fence'	Boolean Y/N
IfcWall	IsFin	Wall object represents 'Fin'	Boolean Y/N
IfcWall	IsGarage	Wall associated to 'Garage'	Boolean Y/N
IfcWall	Transparency	Wall is transparent by a percentage value	Integer 999
IfcWindow	IsHabitable	Window connects to a 'Habitable' room	Boolean Y/N
IfcWindow	IsObscured	Window has obscured glass	Boolean Y/N
IfcWindow	IsScreened	Window features a 'Screen'	Boolean Y/N
IfcWindow	SillHeightAHD	AHD Height for Windowsill	Real

2.3 Modelling Methodologies

2.3.1 Specific methodologies

The following modelling methodologies support the assessment of residential design standards.

Building Features	Rule	IFC Class Name	Parameter
Balcony	<p>Balconies are assessed for encroachments, private open space, and amenity impacts.</p> <p>They must be recorded as a space with assigned parameter set to Y.</p> <p>The floor of a balcony may be modelled as a slab.</p>	IfcSpace IfcSlab	IsBalcony

Building Features	Rule	IFC Class Name	Parameter
Building Stories	<p>Stories are assessed for quantity.</p> <p>A model may have basement, rooftop, and intermediate levels configured however only stories with slabs / floors in a unique vertical domain will be considered a unique storey.</p>	lfcBuildingStorey	
Car Parks (Internal and External)	<p>Carparking spaces are assessed for their quantity and access from boundaries.</p> <p>While car spaces may be enclosed by garages and carports they are all individually drafted as a space with the assigned parameter tagged to Y.</p> <p>Dual car parks are modelled as two spaces with a joining side.</p>	lfcSpace	IsParkingSpace
Carport	<p>A space usage definition - See Spaces. Set assigned parameter to Y.</p>	lfcSpace	IsCarport
Doors	<p>Used to assess access within spaces. Ensure the door space is removed from the attached wall.</p> <p>Doors must not be drafted as generic objects.</p> <p>See parameter options and assign as appropriate.</p>	lfcDoor	HasWindow IsEntrance IsGarage IsHabitable
Eaves	<p>Eaves are assessed for encroachments into setbacks and must be identified within the design.</p> <p>Eaves may be modelled as a range of classes based on the level of detail. Roof eaves can be created as beams with custom profiles. If fascia or eaves are mid-level and form part of a slab, then assign slab with parameter as true.</p>	lfcCovering lfcRoof lfcSlab	IsEave
Fascia	As per Eaves	lfcCovering lfcRoof lfcSlab	IsFascia
Fences	<p>Fences are assessed for their size and transparency.</p> <p>They can be modelled as walls or railings.</p> <p>Parameters exist to define the transparency of walls as a percentage value i.e., 40 for 40% percent transparency. Where no transparency is configured,</p>	lfcWall lfcRailing	IsFence Transparency

Building Features	Rule	IFC Class Name	Parameter
	<p>the wall is considered solid.</p> <p>Otherwise, the light penetration may be calculated when the fence is modelled as a series of railings.</p>		
Garages	A space usage definition - See Spaces. Set assigned parameter to Y.	IfcSpace	IsGarage
Pergola	A space usage definition - See Spaces. Set assigned parameter to Y.	IfcSpace	IsPergola
Porch	A space usage definition - See Spaces. Set assigned parameter to Y.	IfcSpace	IsPorch
Rooms	A space usage definition - See Spaces. Additional parameters are associated with Rooms to define the usage. A bedroom should be a distinct space from a wardrobe.	IfcSpace	IsBedroom IsHabitable IsLivingRoom IsWardrobe
Spaces (General)	<p>Spaces are used to nominate the usage and dimensions of zones within the model.</p> <p>Model them to the internal dimensions of the feature, i.e., for rooms model them to the internal wall boundary.</p>	IfcSpace	IsBalcony IsBedroom IsBicycleStorage IsCarport IsDeck IsGarage IsHabitable IsLanding IsLivingRoom IsParkingSpace IsPergola IsPermeable IsPorch IsPrivateOpenSpace IsStorage IsVerandah IsWardrobe
Topography	Topography (aka terrain) is leveraged for height calculations. The topography may be from surveyed AHD values or a fixed level where topography is not available. The designer may receive topography layers from eComply solutions and alter them to implement cut and fills but be careful not to alter any surveyed boundary height.	IfcSite	
Verandah	A space usage definition - See Spaces. Set assigned parameter to Y.	IfcSpace	IsVerandah
Walls	<p>Walls are measured for their areas.</p> <p>Door cavities must be removed from their</p>	IfcWall	IsFence IsFin IsGarage

Building Features	Rule	IFC Class Name	Parameter
	<p>associated wall so that wall area calculations are not impacted.</p> <p>Walls may be assigned as a fence. (See Fences)</p>		Transparency
Windows	<p>Windows are used for determining views both from the house and into neighbouring models.</p> <p>Windows must not be drafted using generic objects.</p> <p>The sill height of neighbouring models is recorded as a AHD numeric value as meter i.e. 45.12</p>	lfcWindow	IsHabitable SillHeightAHD
Private Open Space	<p>Secluded and recreational private open spaces are used for site calculations and overshadowing assessments.</p> <p>They are modelled by the designer as spaces with the parameter defined.</p>	lfcSpace	IsPrivateOpenSpace
Permeable Areas	<p>Permeable landscape zones are drafted as a space.</p>	lfcSpace	IsPermeable

2.4 Siting

A building model is positioned (or sited) onto a lot boundary. eComply assessments measure the distance of the building elements from the property boundaries.

Building models for neighbouring houses may be sighted based on surveyed lot boundaries, façade features, and windowsill coordinates and heights.

An eComply solution will provide lot boundaries and topography to download from the site context information.

3. Document Control

Contact for Enquiries

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Document History

Version	Date	Author	Summary of changes
1.1	20 12 2023	Luke Bassett	Document Release