Visualizing Ownership in Northern Ireland – from 2D to 3D

Land & Property Services
Seirbhísí Talún & Maoine

ORDNANCE SURVEY OF NORTHERN IRELAND®

Our legacy

- Ordnance Survey of Northern Ireland (OSNI) has a statutory duty to maintain the Northern Ireland map base used across government. OSNI data is used for emergency response, infrastructure planning and environmental management to name a few.

- Historically, we have collected data for the purposes of maintaining the cartographic map-base which was based on sheets and tiles with very little attribution (old NTF format etc) – just an electronic version of a paper map.

- Recently, we have moved to a GIS model which provides a seamless polygonised map base for Northern Ireland, based on themes like buildings, land parcels and water. Our datasets are attributed with relevant information, like change dates and building uses with placeholders for additional attribution in the future.

- We've called this new data model **OSNI FUSION**

Where we are now

- OSNI FUSION has been strongly welcomed by customers as the replacement for electronic cartographic data
- In addition OSNI collect high-resolution orthophotography and create products from this imagery such as our enhanced DTM with breaklines and DSM. OSNI collect orthophotography on a 3 year cycle, capturing one third of Northern Ireland every year.
- The Department for Agriculture in Northern Ireland have recently completed collection of LiDar for Northern Ireland.
- OSNI is part of the wider organisation LAND AND PROPERTY SERVICES who have responsibility for registering and maintaining official property ownership information, valuing properties in Northern Ireland and collecting property tax on every property in Northern Ireland.

Current Challenges

- Identification of overhanging rooms or parts of a building that are obscured by higher parts (alleyways through buildings)
- Identification of subterranean areas including underground car parking
- Difficulty identifying and registering the constituent parts of a building that has multiple owners
- Difficulty identifying and registering the constituent parts of a building that are owned by one person (car space, apartment, bin area)
- Valuation of properties of a high rise block where the valuation may be affected by height and orientation
- Not knowing enough about the property to make an accurate valuation e.g.
  - Not knowing authoritively the number of floors in an apartment block
  - Not knowing authoritively the number of properties in each block
- No current way to accurately calculate gross internal floor area without field survey
- No current way to do volumetric calculations which might affect the valuation (eg. warehouses)

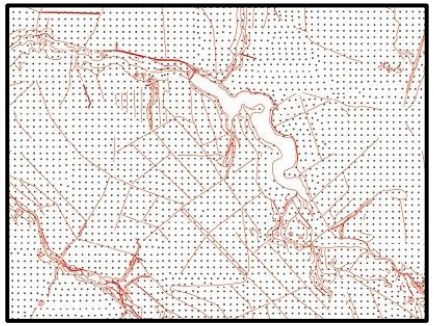
Why 3D?

- 3D solves all of these challenges
- There is a driver for 3D data by our internal customers in Land and Property Services. Currently the organisation may visit a new property multiple times; caused by the different business needs in different business areas.
  - E.g. A valuer may visit a property to determine the characteristics of a building to derive a value.
- The main piece of information needed for valuation is the GROSS EXTERNAL AREA (GEA)
- 3D limits the need for a site visit if time constraints are an issue. 3D assists Computer Aided Mass Appraisal which might use GEA as a variable
- 3D helps identify the parts of a building to be registered leading to less mistakes and a more accurate record of ownership
- 3D enables a much better end-user experience

3D Proof of Concept

Belfast Pilot Area

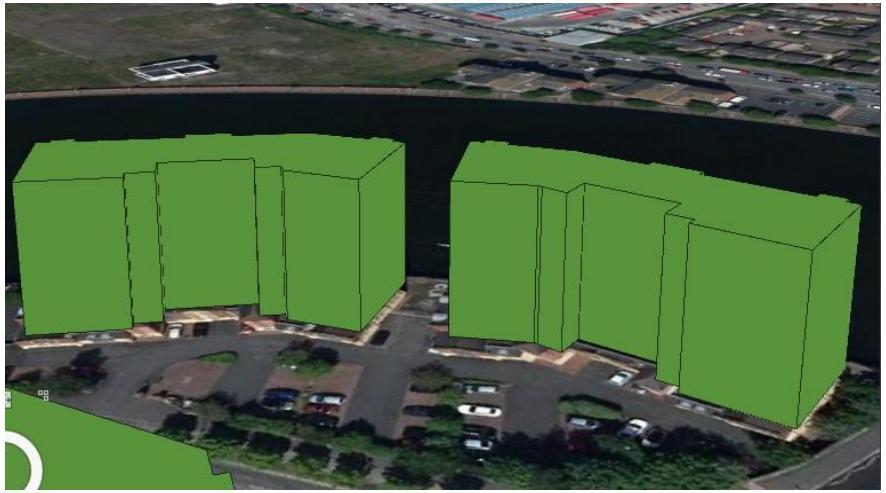
OSNI Fusion Building Footprints



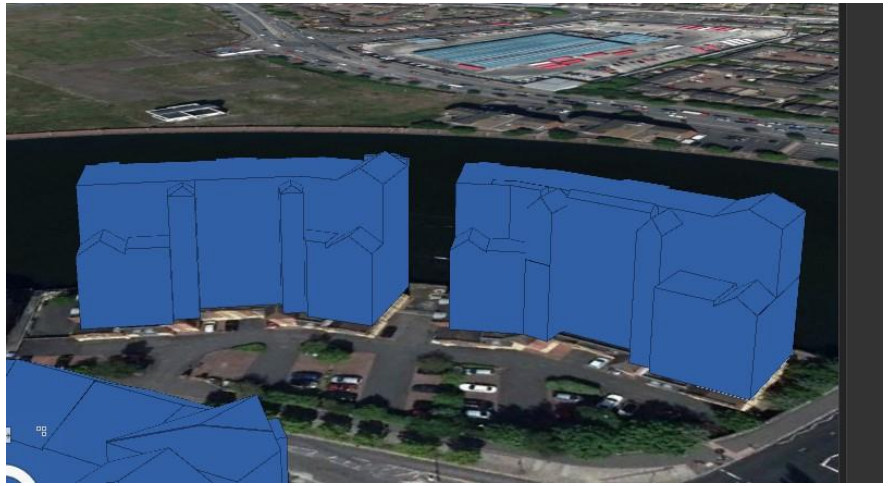
OSNI Digital Terrain Model (DTM)

OSNI Digital Surface Model (DSM)

OSNI Orthophotography



Level of Detail 1 (LOD1) Buildings



Level of Detail 2 (LOD2) Buildings

ORDNANCE SURVEY

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BU_BUILDING -

FUSIONID	b8e6cce5-06b8-491c-ac7a-ff37a32ba257
STARTOFLIFEDATE	12/02/2016
CHANGEDATE	12/02/2016
REASONFORCHANGE	Data Migration
CAPTURESOURCE	Data Model Team
CAPTURESOURCEDATE	12/02/2016
CAPTURESOURCESUPPLIER	LPS Mapping
ZORDER	0
GROUNDHEIGHT	0
ORDEROFACCURACY	Draped
TYPECODE	DO_Apart
HEIGHTABOVEGROUND	0
NUMBEROFSTOREYS	0
PARTID	b3e6cce5-06b8-491c-ac7a-ff37a32ba257
BUILDINGNUMBER	<Null>
SHAPE_Length	140.136106
SHAPE_Area	669.545975

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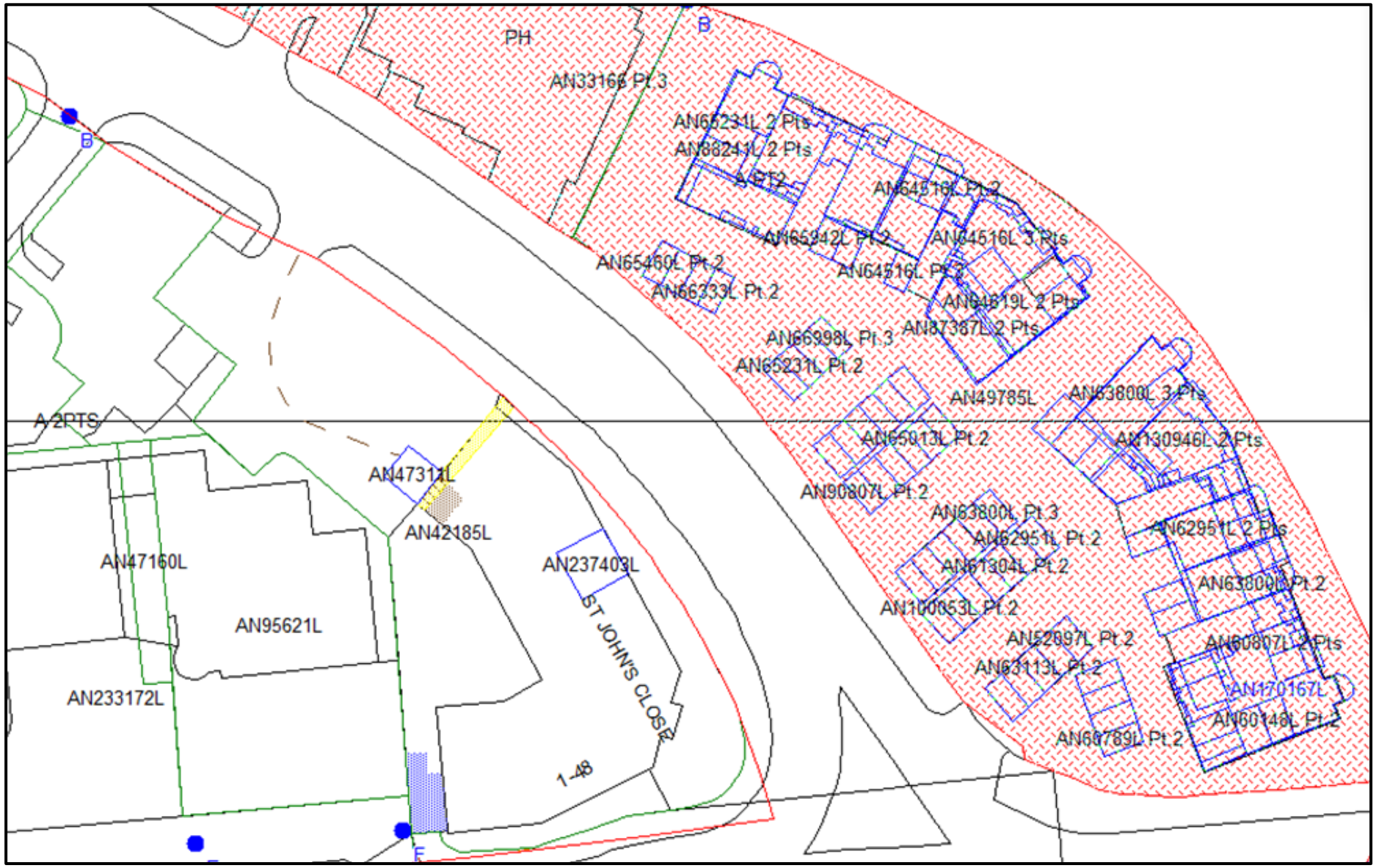
LAND REGISTRY



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VALUATION

PROPERTY1: Property

File Edit View Data Tools Links Reports Window Help

CAMA Map Query

Property ID 818220
UPRN 185952393
*Primary Class Privately Built Housing
Sub Class Purpose Built Apartment
Type Single Level Self Contained
*District Belfast City Council
*Ward Central
Old District Belfast City Council
Old Ward Shaftesbury
IGSheet/Plan /
X/Y Coord 334875 / 373981

Property Flag
Desc In Val List flat gd & car space
Capital Value Non EX £110,000
Capital Value EX
Other Classes No
Total NAV £
*Address APARTMENT 1 ST. JOHNS WHARF 1 Laganbank Road Town I
Preview Address
Hereditament Status Built
Occupation Status Occupied

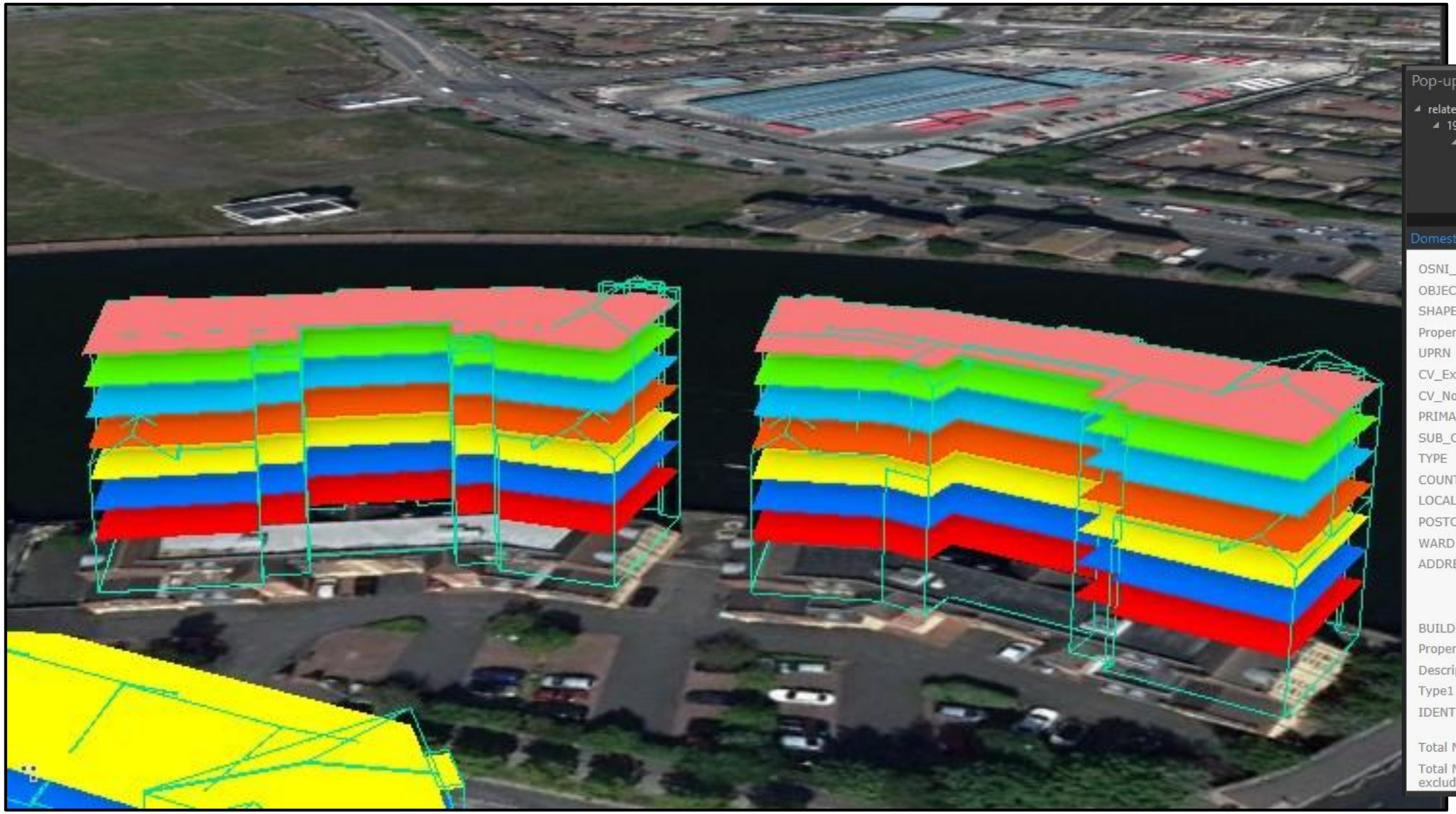
Val List 7
Adjustments
Valuer Review
Ground Floor VL Size
Internal VL Size
611/281 Internal VL Size
Art. 31 (5)

Hereditament
Occupier Unknown
Data Retention details
Updated From Pointer
Sketch Attached
All Val Lines Reviewed for Reval
Approved for Reval
Online Form Of Return Submitted
RALQ 2020 Form Submitted

Pubs | Filling Stations | Assets Summary Screen | Rating Summary Screen | Tone AVM | Comparables Search

Result Set | Interested Parties | Services | Neighbourhood | Domestic Details | Machinery | Val Items | Summary | Cases | Notes | List Entry | Dimensions | spatialest Comps | Transaction | Attachment | Audit | Hot

Rec	Property ID	Reval	Address	UPRN	Primary Class	Sub Class	Type	Council District	Ward	IGSheet	Plan
1	818220	☐	APARTMENT 1 ST. JOHNS WHARF 1	185952393	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
2	818221	☐	APARTMENT 2 ST. JOHNS WHARF 1	185952394	Privately Built Housing	Purpose Built Apartment	Multi-Level Self Contained	Belfast City Council	Central		
3	818222	☐	APARTMENT 3 ST. JOHNS WHARF 1	185952395	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
4	818223	☐	APARTMENT 4 ST. JOHNS WHARF 1	185952396	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
5	818224	☐	APARTMENT 5 ST. JOHNS WHARF 1	185952397	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
6	818225	☐	APARTMENT 6 ST. JOHNS WHARF 1	185952398	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
7	818226	☐	APARTMENT 7 ST. JOHNS WHARF 1	185952399	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
8	818230	☐	APARTMENT 8 ST. JOHNS WHARF 1	185952400	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
9	818231	☐	APARTMENT 9 ST. JOHNS WHARF 1	185952401	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
10	818232	☐	APARTMENT 10 ST. JOHNS WHARF 1	185952402	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
11	818233	☐	APARTMENT 11 ST. JOHNS WHARF 1	185952403	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
12	818234	☐	APARTMENT 12 ST. JOHNS WHARF 1	185952404	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		
13	818236	☐	APARTMENT 13 ST. JOHNS WHARF 1	185952459	Privately Built Housing	Purpose Built Apartment	Single Level Self Contained	Belfast City Council	Central		



Pop-up

- relateableTestData_floorsplits (1)
  - 195
    - Domestic (9)
      - BELFAST SOUTH
      - BELFAST SOUTH
      - BELFAST SOUTH
      - BELFAST SOUTH

Domestic - BELFAST SOUTH

OSNI_ID	1896
OBJECTID	11
SHAPE	Polygon Z
Property_ID	840825
UPRN	186003138
CV_Exempt	0
CV_Non_Exempt	125000
PRIMARY_CLASS	Privately Built Housing
SUB_CLASS	Purpose Built Apartment
TYPE	Single Level Self Contained
COUNTY	ANTRIM
LOCAL_COUNCIL	BELFAST
POSTCODE	BT1 3LT
WARD	CENTRAL
ADDRESS	APARTMENT 58, ST. JOHNS WHARF, 1-3 LAGANBANK ROAD, TOWN PARKS, BELFAST, ANTRIM, BT1 3LT
BUILDING_TYPE	Domestic
Property_Size	60
Description	flat 1f & car space
Type1	Flat
IDENTIFIER	b8e6cce5-06b8-491c-ac7a-ff37a32ba257
Total Number of Floors	7
Total Number of Floors - excluding converted attics	7

3D PoC Results

- We consulted staff on the PoC models to gain feedback and to shape our methodology for mass production of 3D building data.
- 81% of staff surveyed use mapping in their day job but 63% of staff surveyed highlighted that current mapping does not meet their requirements. The main issue being the lack of a real-world view.
- 83% of staff surveyed highlighted that they see a requirement for 3D model in their work area; the main reason being for better visualisation of data.
- 66% of staff surveyed stated that the prototype would suit their needs. The main reason given for not meeting user needs was that the floors were not split into units.
- **The PoC has flagged a number of areas where OSNI needs to restructure data or collect more granular data.**

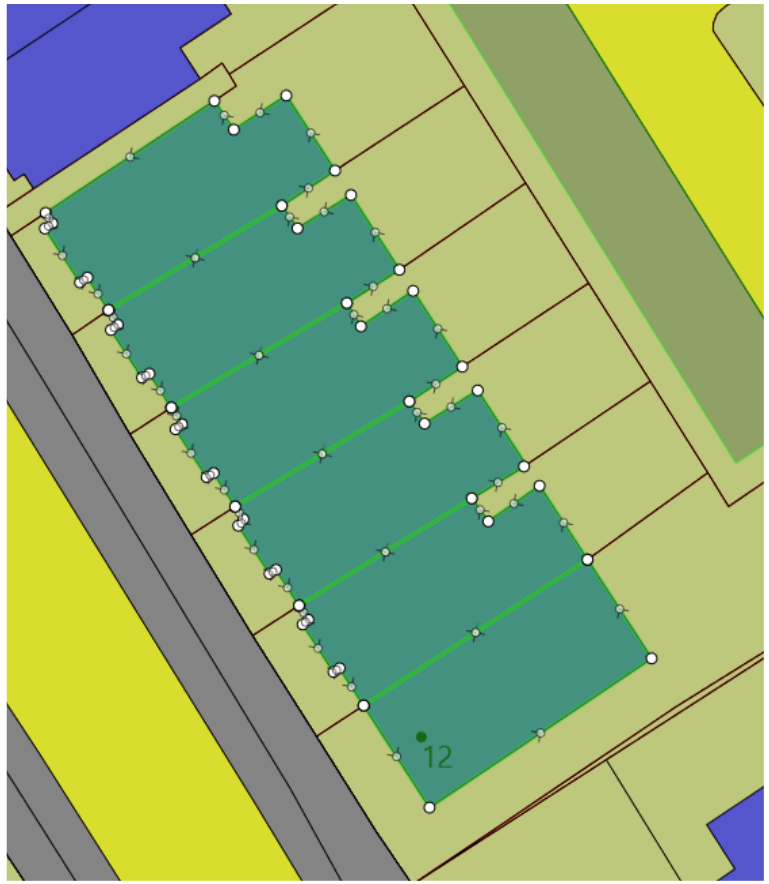
Our LPS 3D Model Strategy

- We've developed work packages to make our data 3D capable:
  - WP1 – Data capture.
  - Populate the existing NUMBEROFSTOREYS attribute
  - Split complex buildings into building parts (next slide)
  - Capture building heights as attribution
  - Add the floor number to unique properties and move the point to the correct spatial location

  - WP2 – Data Model
  - Provide an Oracle schema that will support the storage and publishing of 3D data. The model must be based on CityGML 3 standard and conform to LOD 2.1/2.2

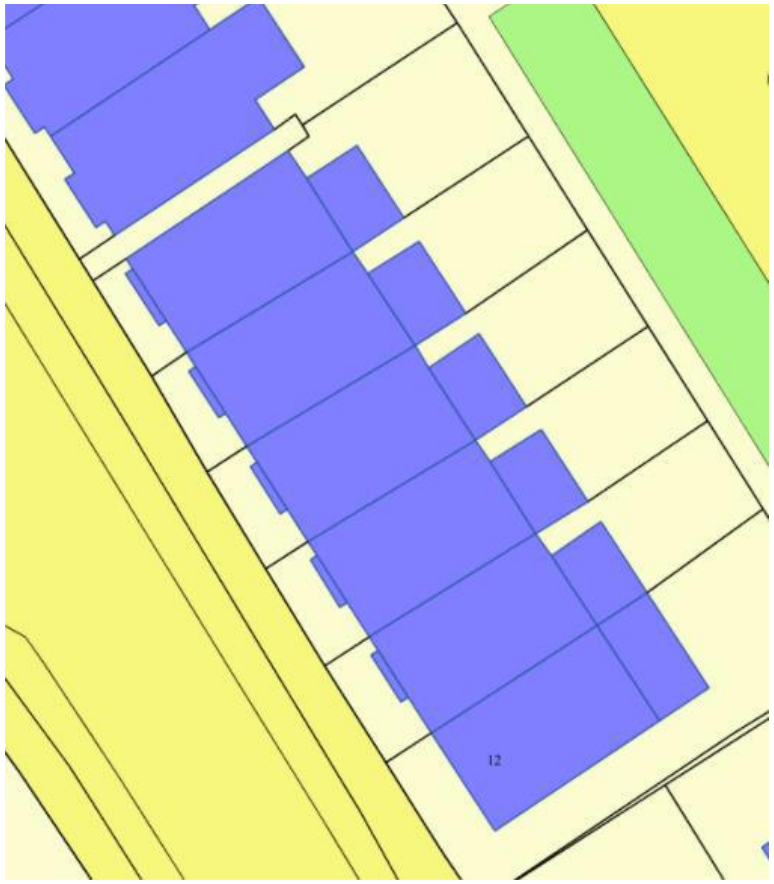
  - WP3 – Generation of simple representative 3D buildings
  - WP4 – 3D Visualiser
  - WP5 – Generate representative floor data
  - WP6 – Generate representative 3D property data
  - WP7 – Capture accurate building shapes
  - WP8 – Capture accurate property shapes (within buildings)
  - WP9 – Sub-terrain data

Current



Our current survey spec captures the building as one footprint and only the number of floors of the main building part

Future

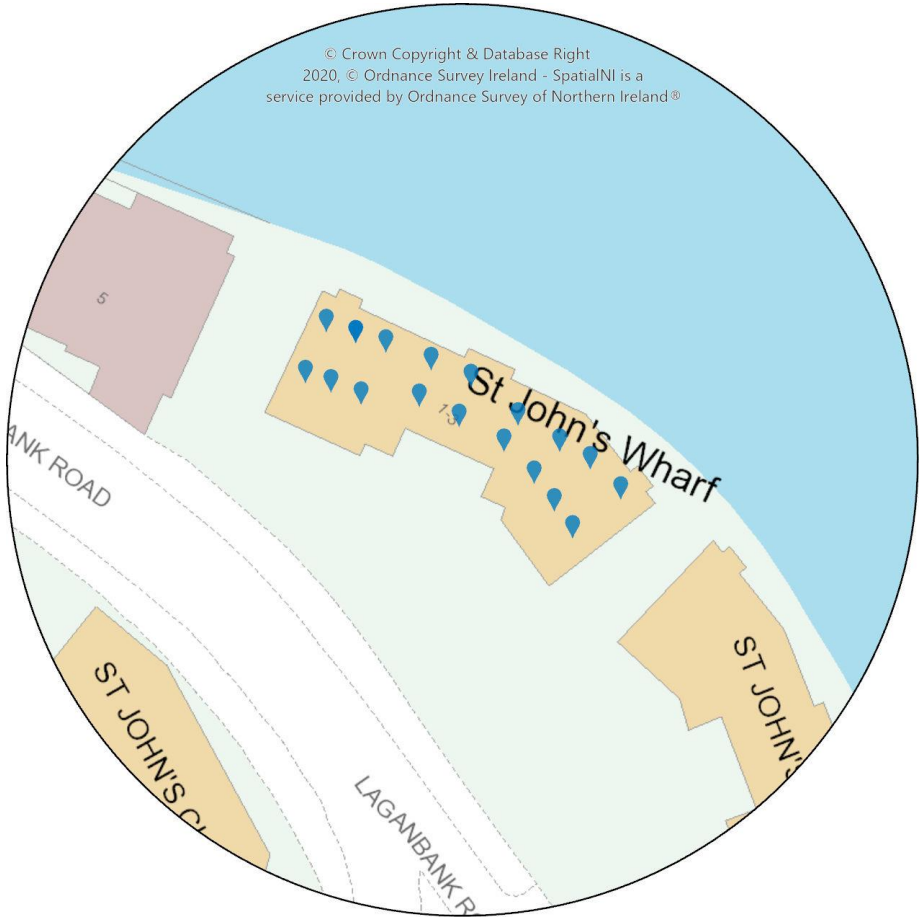


We need to capture each constituent part of the building, including bay windows and balconies.
We need to capture the number of floors of each building part.

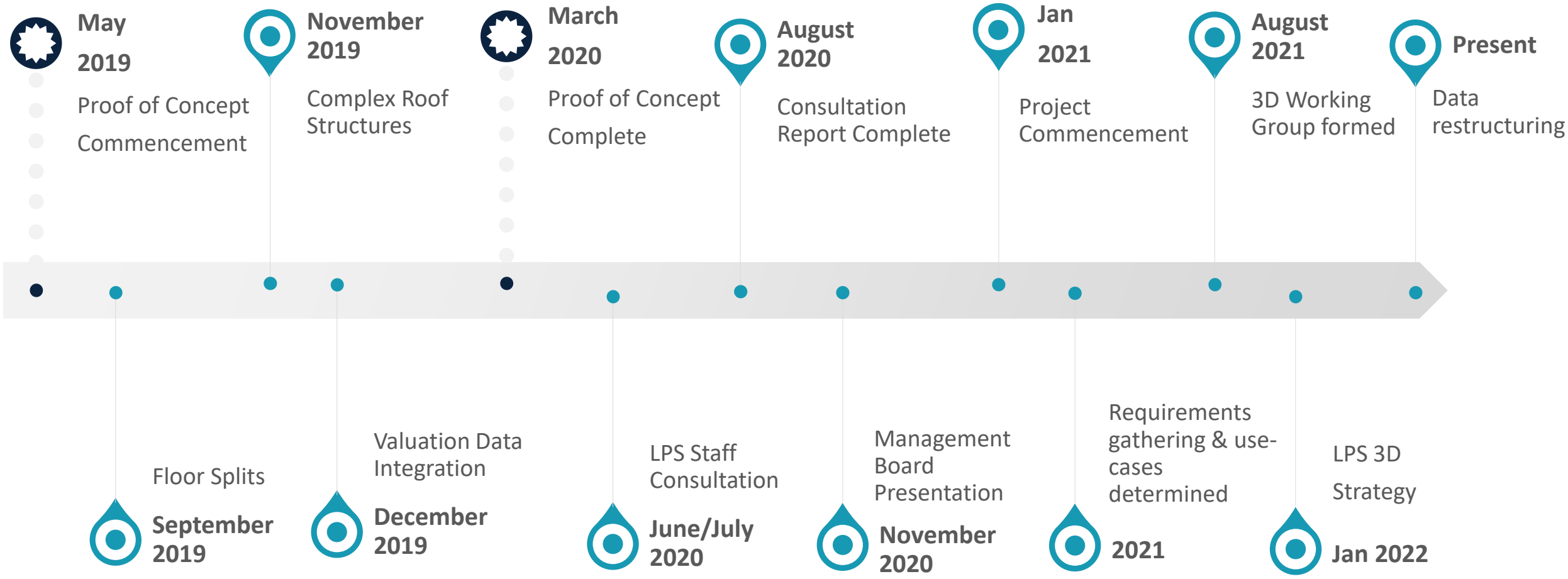
Current

One stacked point in the centre of the building

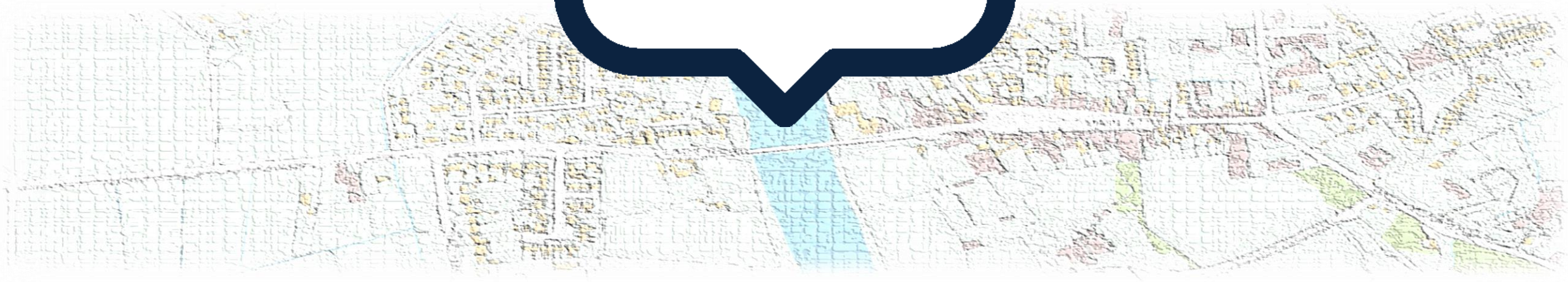
Future



Points in the centre of the properties within the building – still some stacked points, but they're accurate


May 2019
Proof of Concept Commencement
November 2019
Complex Roof Structures
March 2020
Proof of Concept Complete
August 2020
Consultation Report Complete
Jan 2021
Project Commencement
August 2021
3D Working Group formed
Present
Data restructuring
Floor Splits
September 2019
Valuation Data Integration
December 2019
LPS Staff Consultation
June/July 2020
Management Board Presentation
November 2020
Requirements gathering & use-cases determined
2021
LPS 3D Strategy
Jan 2022

Conclusion

- There is a lot of preparatory work to do to make our data 3D ready for the automatic generation of models which will have significant resource implications in the organization
- We have a roadmap for the next few years which will help us achieve our requirements as defined by our users.
- The complete generation of a 3D buildings dataset, split into floors and units, is still a way off!

THANK YOU