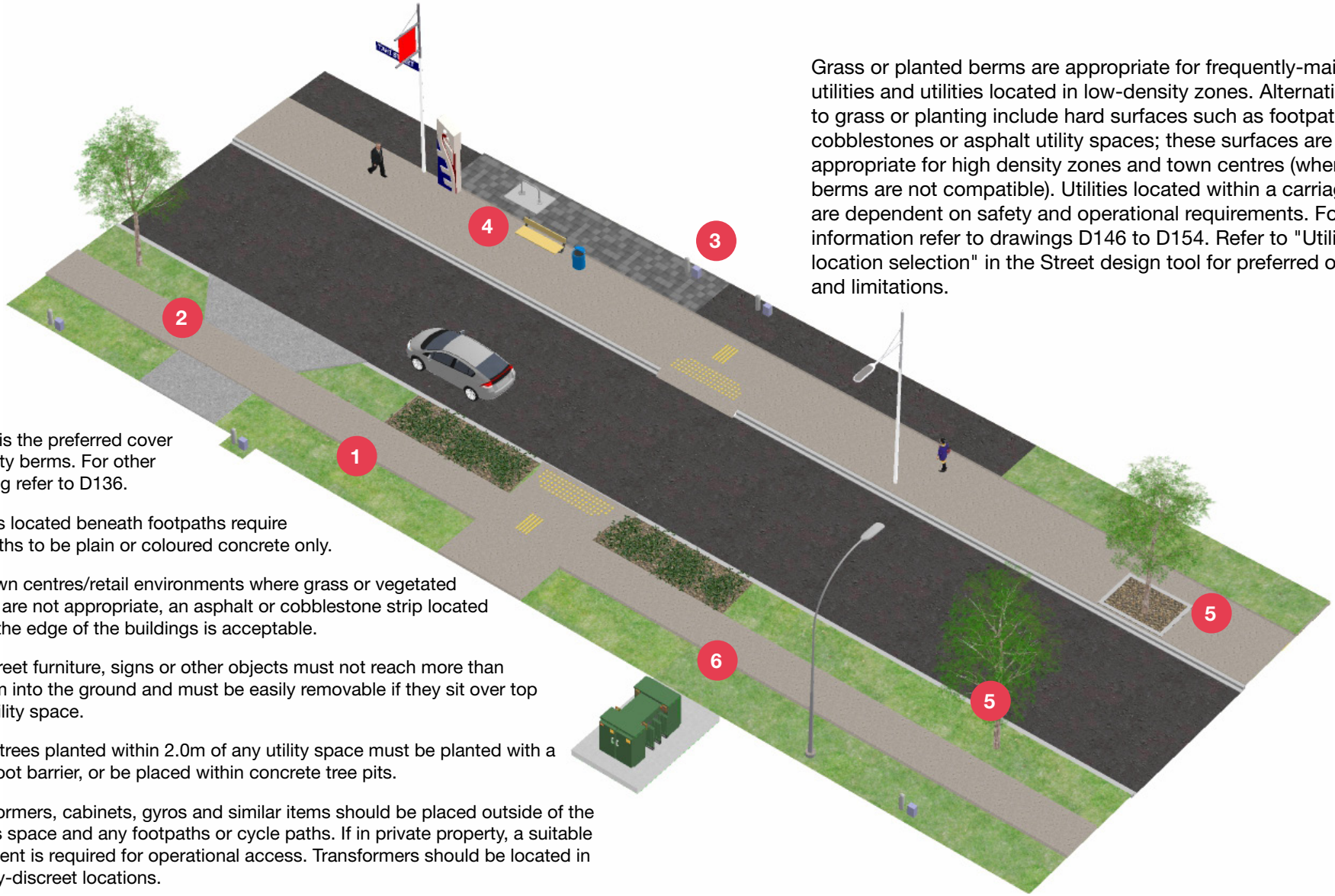

Grass or planted berms are appropriate for frequently-maintained utilities and utilities located in low-density zones. Alternatives to grass or planting include hard surfaces such as footpaths, cobblestones or asphalt utility spaces; these surfaces are only appropriate for high density zones and town centres (where grass berms are not compatible). Utilities located within a carriageway are dependent on safety and operational requirements. For further information refer to drawings D146 to D154. Refer to "Utilities location selection" in the Street design tool for preferred options and limitations.

1. Grass is the preferred cover on utility berms. For other planting refer to D136.
2. Utilities located beneath footpaths require footpaths to be plain or coloured concrete only.
3. For town centres/retail environments where grass or vegetated berms are not appropriate, an asphalt or cobblestone strip located along the edge of the buildings is acceptable.
4. Any street furniture, signs or other objects must not reach more than 150mm into the ground and must be easily removable if they sit over top of a utility space.
5. Street trees planted within 2.0m of any utility space must be planted with a solid root barrier, or be placed within concrete tree pits.
6. Transformers, cabinets, gyros and similar items should be placed outside of the utilities space and any footpaths or cycle paths. If in private property, a suitable easement is required for operational access. Transformers should be located in visually-discreet locations.

Note: Road crossings of services should be avoided in locations with formal parking, loading spaces and vehicle crossings

Utilities elements

Utilities locations

Infrastructure Development Code
Street Design Diagrams

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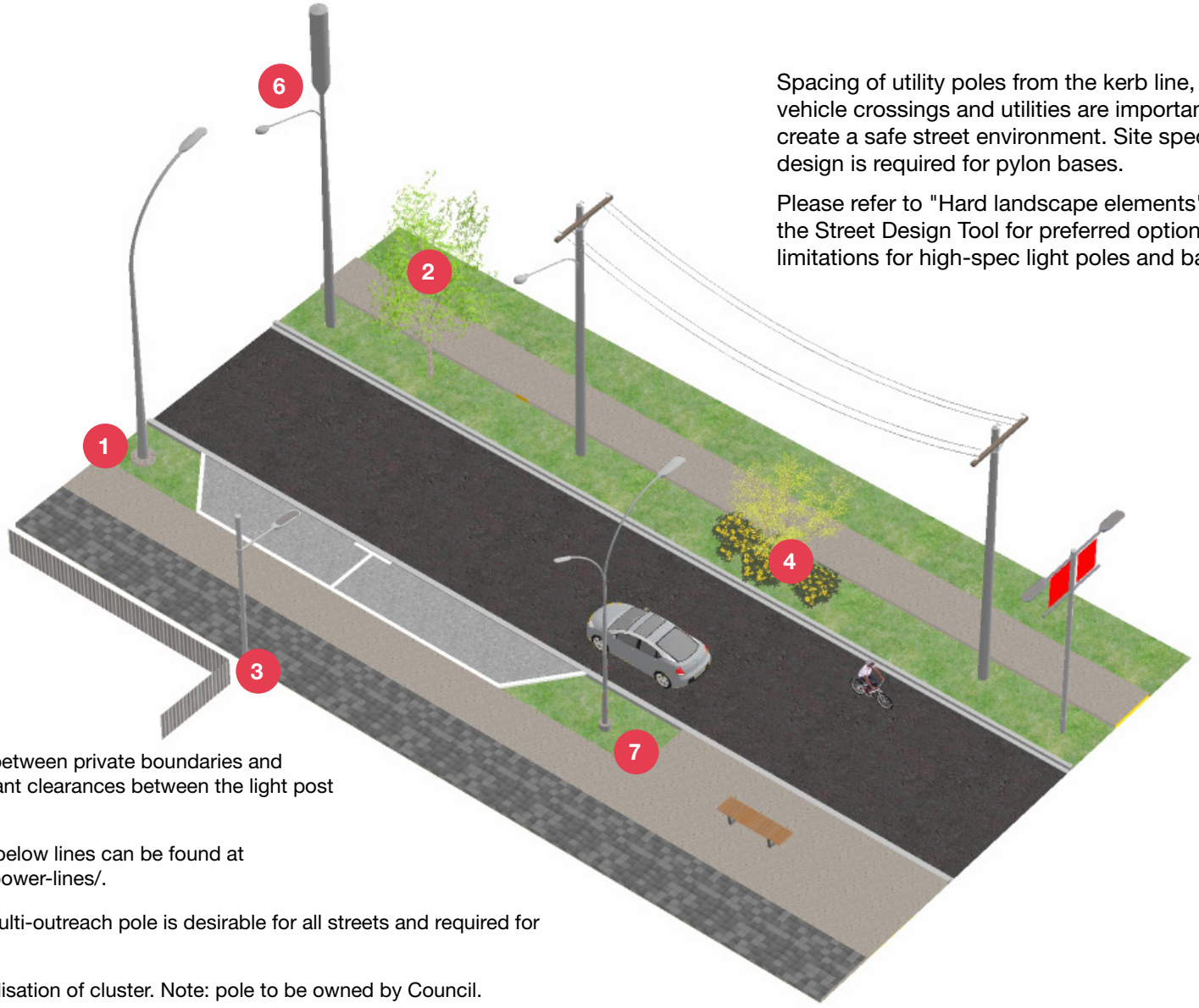

Spacing of utility poles from the kerb line, vehicle crossings and utilities are important to create a safe street environment. Site specific design is required for pylon bases.

Please refer to "Hard landscape elements" in the Street Design Tool for preferred options and limitations for high-spec light poles and banners.

1. 1.5m separation between poles and car parks of vehicle crossings and where service trenches allow, 1.0m separation from kerb line.
2. Min 3.0m between any part of a pole or fixture and a tree trunk.
3. Light posts in back berms are located between private boundaries and clear of underground services. All relevant clearances between the light post and all services in the back berm apply.
4. Clearance requirements for vegetation below lines can be found at www.powerco.co.nz/safety/trees-and-power-lines/.
5. Combining multiple functions on one multi-outreach pole is desirable for all streets and required for Places for people.
6. Light pole and telco infrastructure – realisation of cluster. Note: pole to be owned by Council.
7. Double outreach pole; backlight to provide for footpath if not achievable from the front road light.

Utilities elements

Utility poles, incl. power, communications and lights

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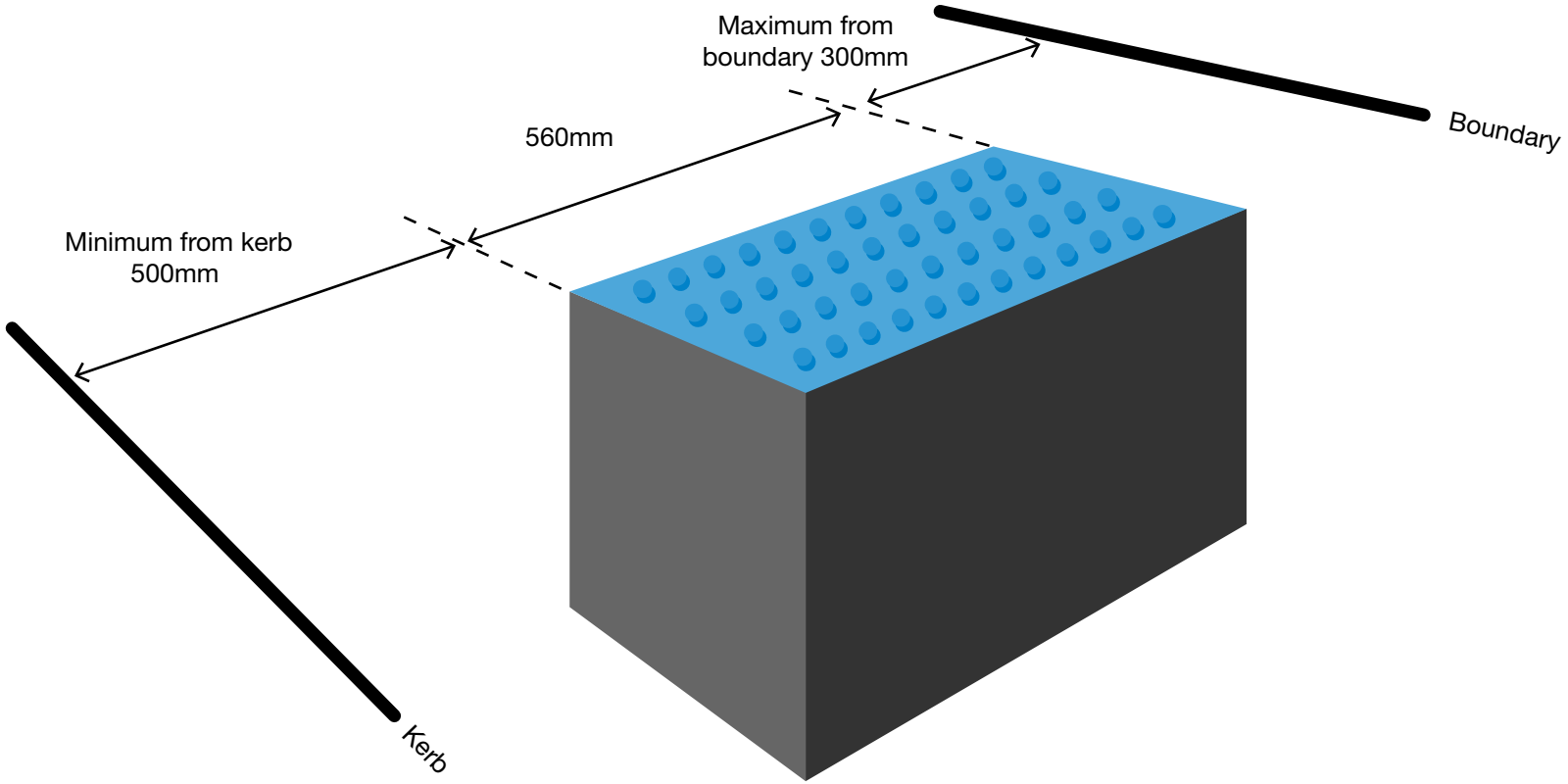
Utility type	Typical outside diameter (mm) per duct. Specific design will be required	Min. cover[1] (mm)	Max. depth[2] (mm)	Minimum horizontal clearance from parallel utilities[3], structures or trees (mm)	Minimum vertical clearance when crossing other utility services[4]									
					Power[14]			Communications	Gas	Water Supply[5]	Wastewater	Stormwater	Bulk Water[6]	Bulk Wastewater Rising Main
					Low Volt (LV)	11kV	33kV							
Power[14] – Low Voltage (LV)	100 (multiple typically required)	600	800	300 (500 from boundary[7])	150	150	150	300	300	300	300	300	300	300
Power[14] –11kV	100 to 150	900	1100	300 (500 from boundary[7])	150	150	150	450	300	300	300	300	300	300
Power[14] – 33kV		1100	1400	500 (500 from boundary[7])	150	150	150	500	500	500	500	500	500	500
Communications	44 (1 to 12 ducts)/ 100 for road crossing	600/1000[8] berm/road	800/1200 berm/ road	300, 450[9] from 11kV and 500 from 33kV. Beyond the dripline of trees[12]	300	450	500	150	300	150	150	150	150	300
Gas distribution lines	42.1, 60.2, 114.1	800	1200	300	300	300	500	300	300	300	300	300	300	300
Water supply	125 / 63 (Ridermain)	800/1200 berm/road	1200/1400 berm/road	1000 from Wastewater, 500 from power and kerbs[10], 300 all other utilities. Beyond the dripline of trees	300	300	500	150	n/a[11]	500	500	300	500	500
Wastewater		600 non trafficable areas on private property/900 berm or road	3000[12]	1000 from Water supply, 5000 from trees[12]	300	300	500	150	300	n/a[11]	150	150	n/a[11]	300
Stormwater			3000[12]	5000 from trees[12]	300	300	500	150	300	n/a[11]	150	150	n/a[11]	300
Bulk water		Specific design	Specific design	Specific design	300	300	500	150	n/a[11]	500	500	300	500	500
Bulk wastewater rising main		900/1200 (berm/road)	3000	500, 1000 from structures	300	300	500	150	300	500	300	150	500	n/a
Structures such as pits and small structures[13]		n/a	n/a	150[13] (for up to 2m), 1000 from bulk wastewater rising main	100	100	150	150	150	150	150	150	150	1000
Power[14] – Low Voltage (LV)	100 (multiple typically required)	600	800	300 (500 from boundary[7])	150	150	150	300	300	300	300	300	300	300

Note: Please see T148 for information on the notes.

Standard utility arrangement for service trenches is shown in diagram T154.
For utility crossings the designer is responsible that the separation distances are met.

Explanatory notes:	
[1] Minimum cover is measured from ground level to the top of the pipe/duct/cable. During design, consider the minimum depth requirements under the road to keep watermains at the same grade. [2] Maximum depth is measured from ground level to bottom of the pipe/duct/cable. [3] This is the minimum horizontal clearance from other utilities (measured from pipe collars and external walls). [4] Read across for service crossing over and read down for service crossing under. Vertical clearances apply when one utility cross another, except in the case of water supply and wastewater when a vertical separation shall always be maintained (water above), even when the water supply and wastewater pipe are parallel (to minimize the possibility of backflow contamination in the event of a main break). Crosses at an angle as near as possible to 90°. [5] Apply to watermains with DN≤375. [6] Apply to watermains with DN>375. [7] Minimum of 500mm from boundary applies to all utilities to prevent damage from fencing contractors. [8] Can be reduced to 500mm/600mm in agreement with the utility	[9] This can be reduced to 300mm as long as the vertical separation provides a diagonal separation for safe working of >450mm from 11kV cables and >500mm from 33kV. [10] From the nearest edge of the concrete. Note that at smaller distances (e.g. 500mm) from the back of the kerb, the location of gate and sluice valves at road crossing are problematic. Specific design required. [11] Water supply should always cross over wastewater and stormwater and under gas. [12] Specific design (e.g. root guard barrier) and approval required if not achievable. For communications the network may be ducted beneath if the trees are installed sparse enough and positioned where access (i.e. for customer connections) is not required. [13] For retaining walls refer to Standard Drawing T1012. For poles, specific design and agreement with utility provider required. [14] For distances up to 2m provided the structure is not likely to be destabilized by maintenance excavation on the utility. Minimum distances from cables still apply. [15] Note additional requirements in New Zealand Electrical Code of Practice for Electrical Safe Distances (NZECP 34).



Utilities elements

Water meter box

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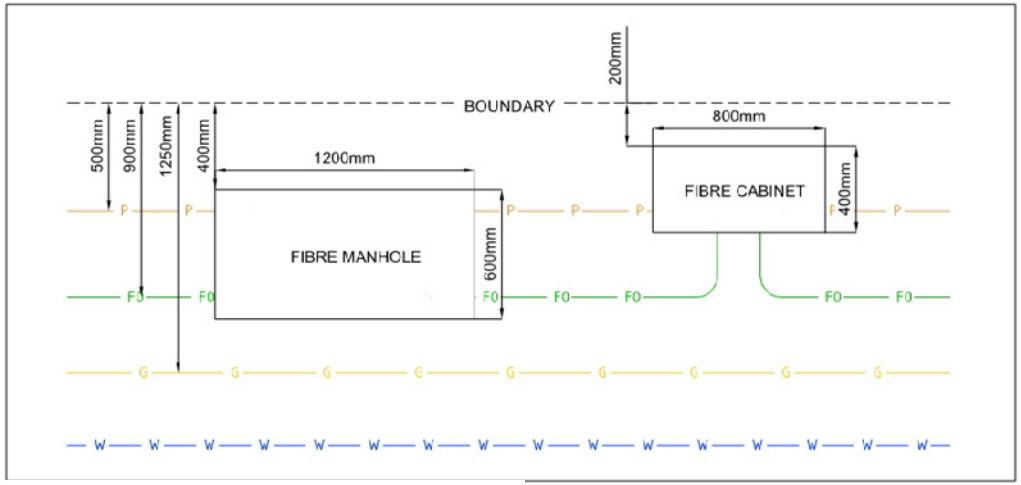
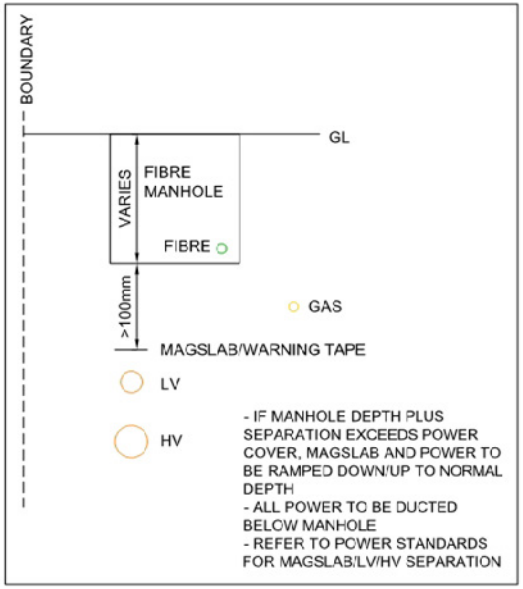


Typical fibre manhole detail. Not to scale

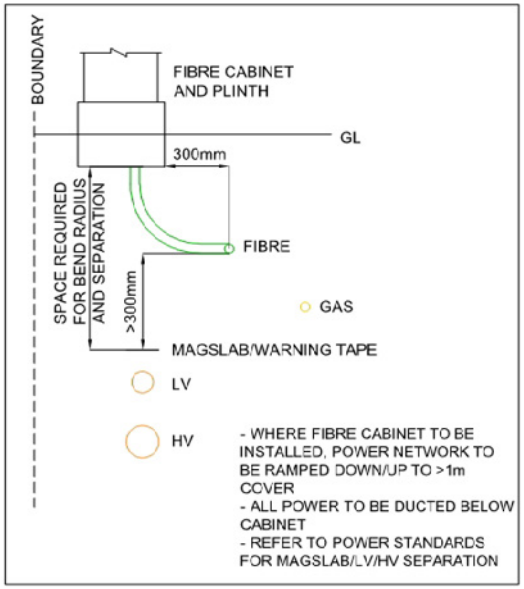
Position pit on an alignment that allows the most practical location for access so that opening has the least impact on pedestrian (or vehicle) traffic.

LEGEND:

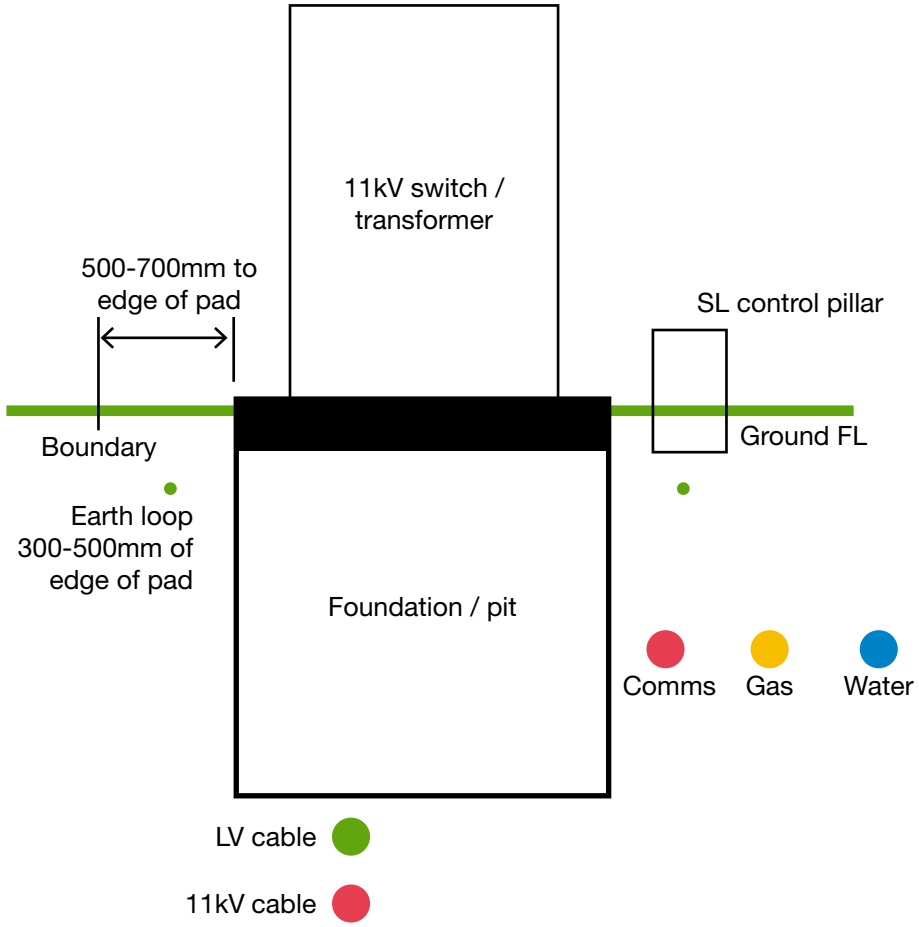
- FO — PROPOSED FIBRE
- P — PROPOSED POWER
- G — PROPOSED GAS
- W — PROPOSED WATER



Typical fibre manhole elevation. Not to scale



Typical fibre cabinet detail. Not to scale



Utilities elements

Power equipment pad

Infrastructure Development Code
Street Design Diagrams

D151

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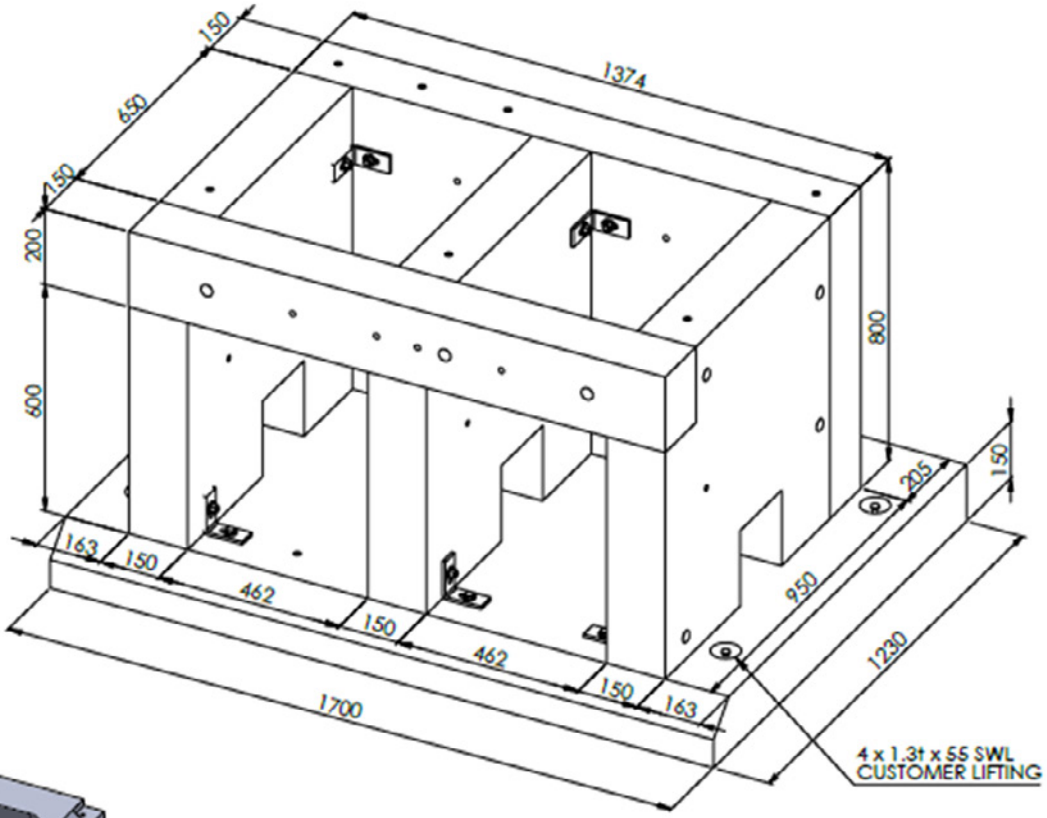

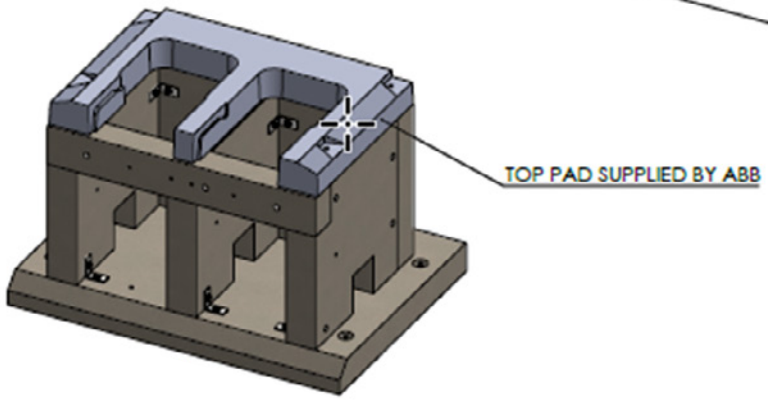

Pit details in design but will be the same footprint as the transformer pad.

Etel 500-1000 KVA

2400x1300

BET 5-1

Busck

Utilities elements

11kV switch pad dimensions

Infrastructure Development Code
Street Design Diagrams

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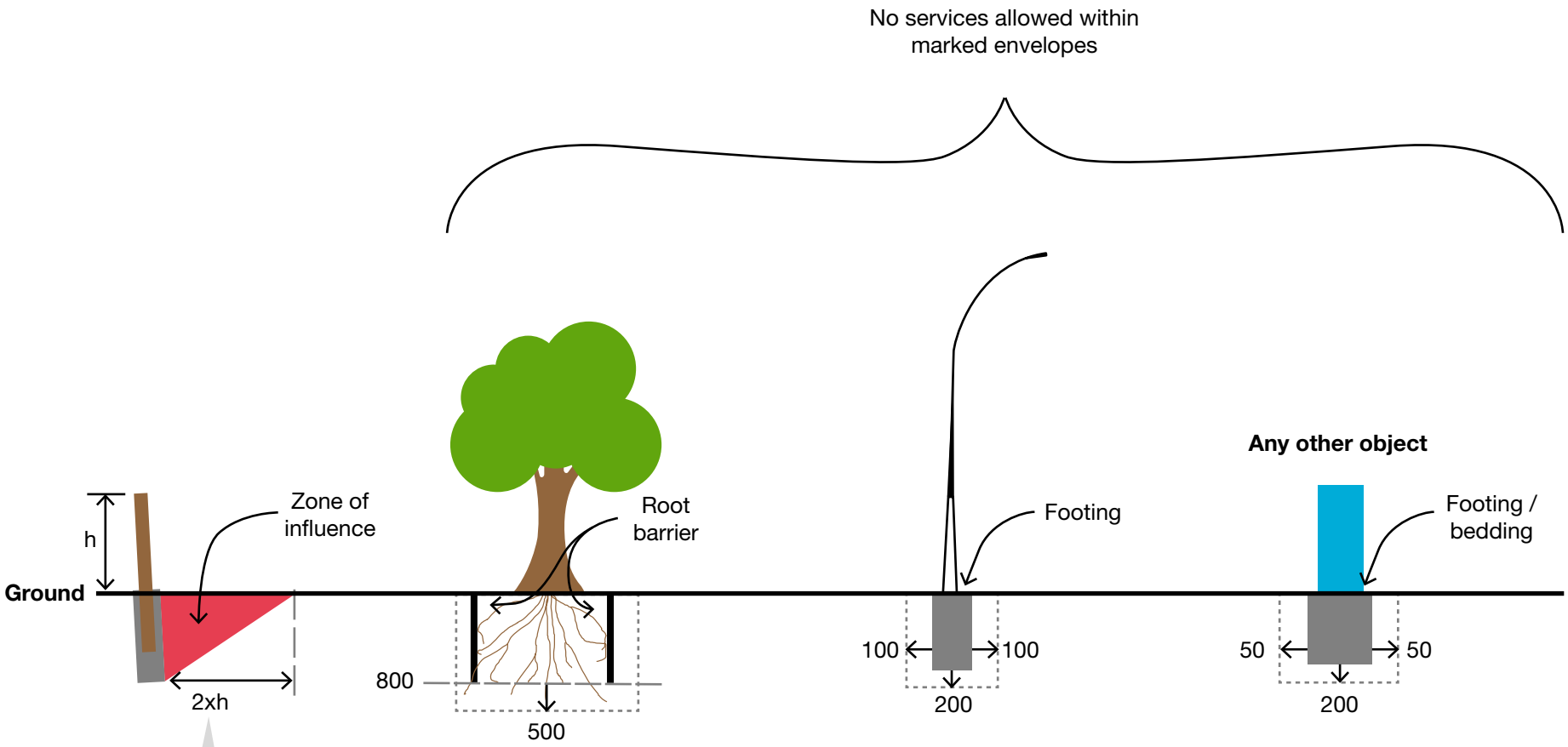

Irrespective of the wall type if buried services are present or are to be installed where X <=2H, the wall design must take account for future excavations required to install services or to repair services. This must be summarised in the retaining wall design and certification documents.

Dimensions are in mm

Utilities elements

Above-ground objects

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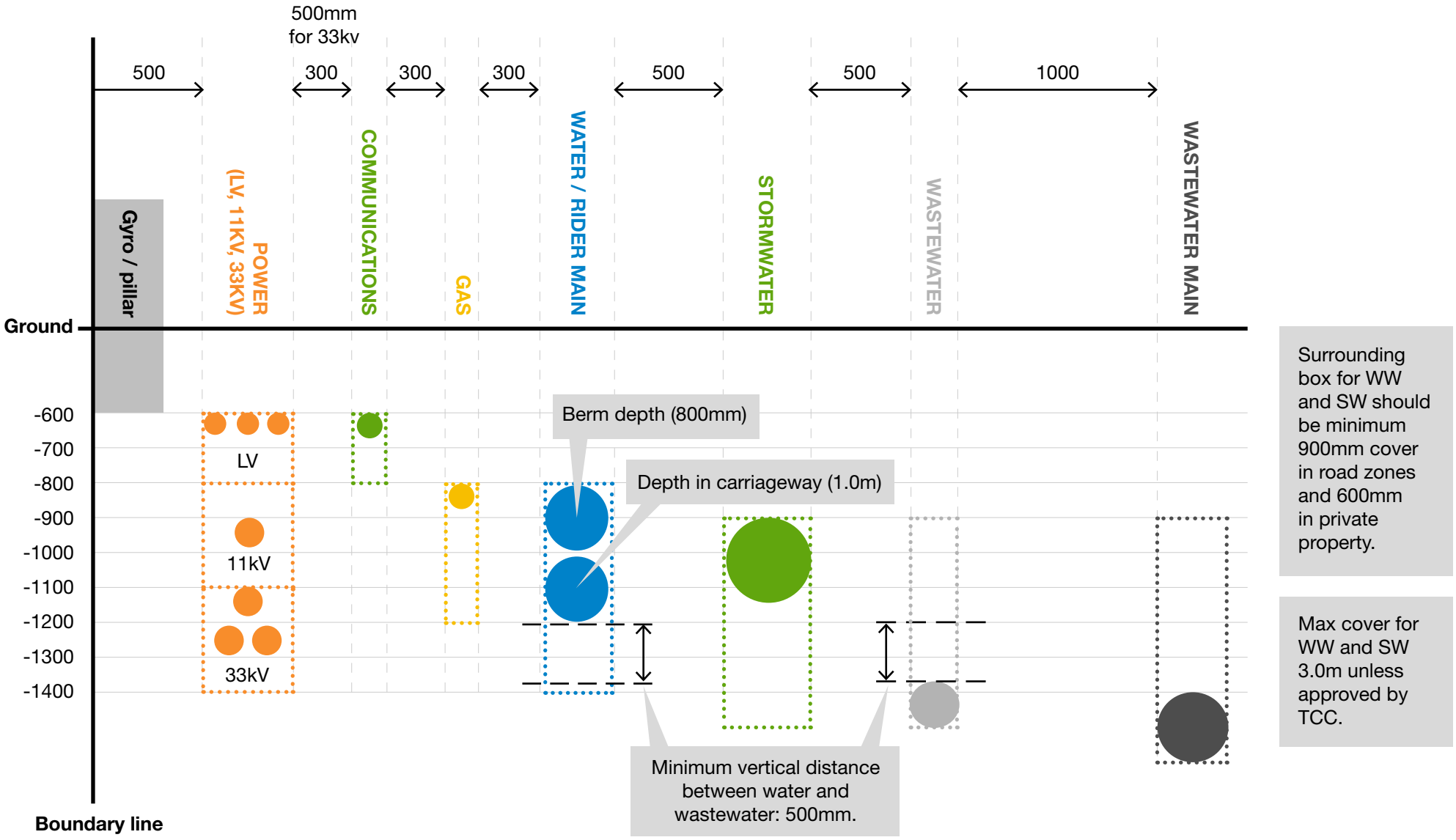

Utilities elements

Standard utilities arrangement

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Street Design Diagrams

D154

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