

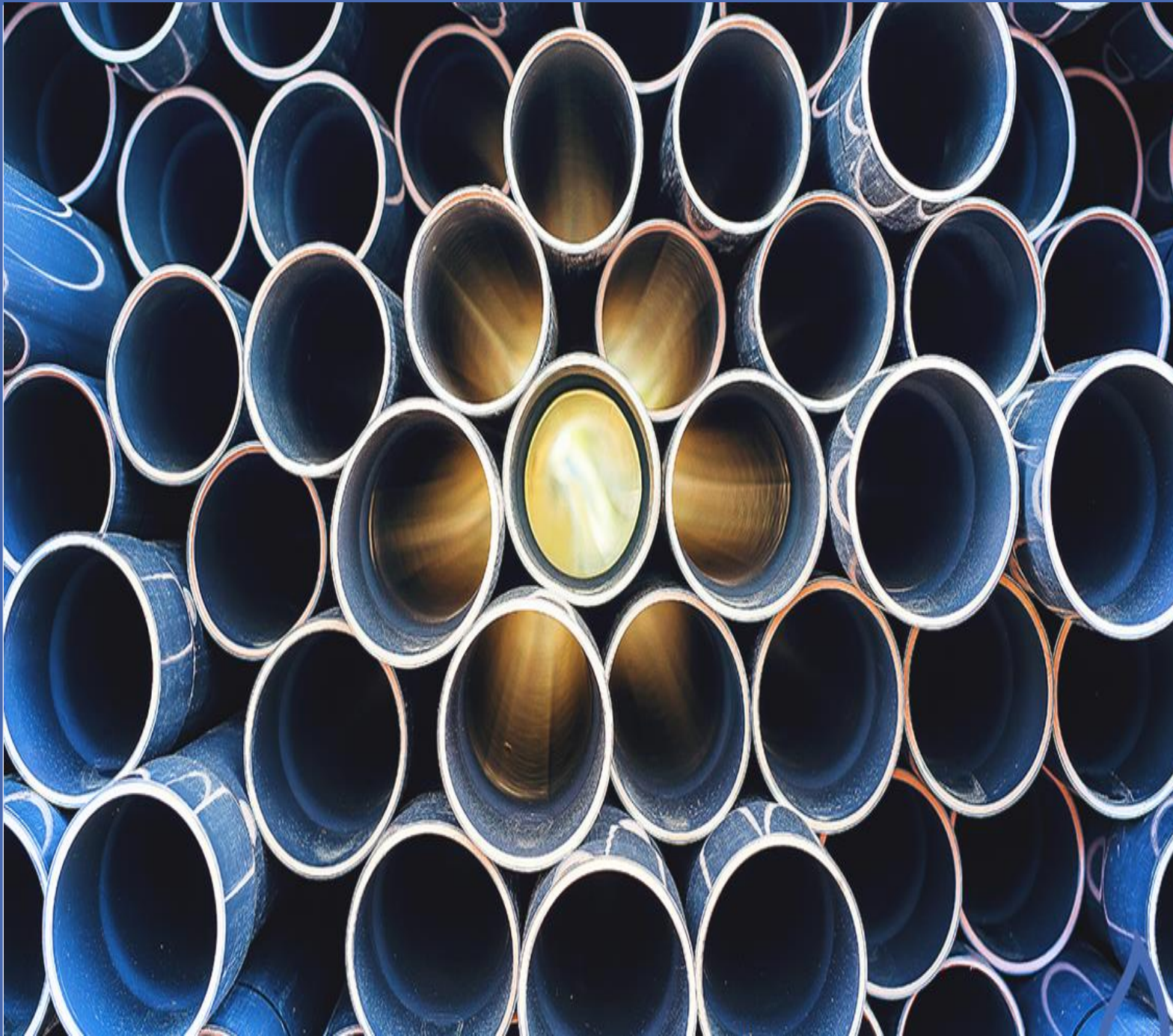


Discovering Inground Pump Stations

Learning Outcomes

- What are inground pump stations?
- Why would they be needed?
- How they differ from small-bore macerators, grey water pumps, and lifting stations.
- Pumping principles and applications
- How do they work
- Rules and Regulations





Limitations to Conventional Plumbing

- Inaccessibility
- Inflexibility.
- Inappropriate applications





What are inground pump stations?

- An inground pump station captures waste from plumbing fixtures or stormwater systems
- Provide an efficient solution when gravity-reliant sewerage and stormwater systems are not possible due to limited site access and site constraints.
- It is an integrated system consisting of a tank, submersible pumps and control equipment.





Why does one need them?

- Rapid urbanisation and population growth puts more pressure on land developments
- Land shortages make it important for each square metre to be used effectively.
- Increased demand has led to growing trends to open tracts of previously unused land for new developments.

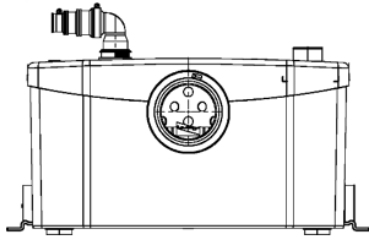




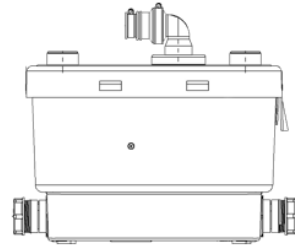
Why does one need them?

- Repurposing and redevelopment of existing property
 - Adding a Granny flat
 - Adding a rental unit IE Air BnB
 - Redirecting an old septic system to new council mains

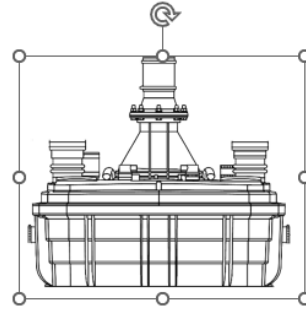




Macerator pump



Grey water pump

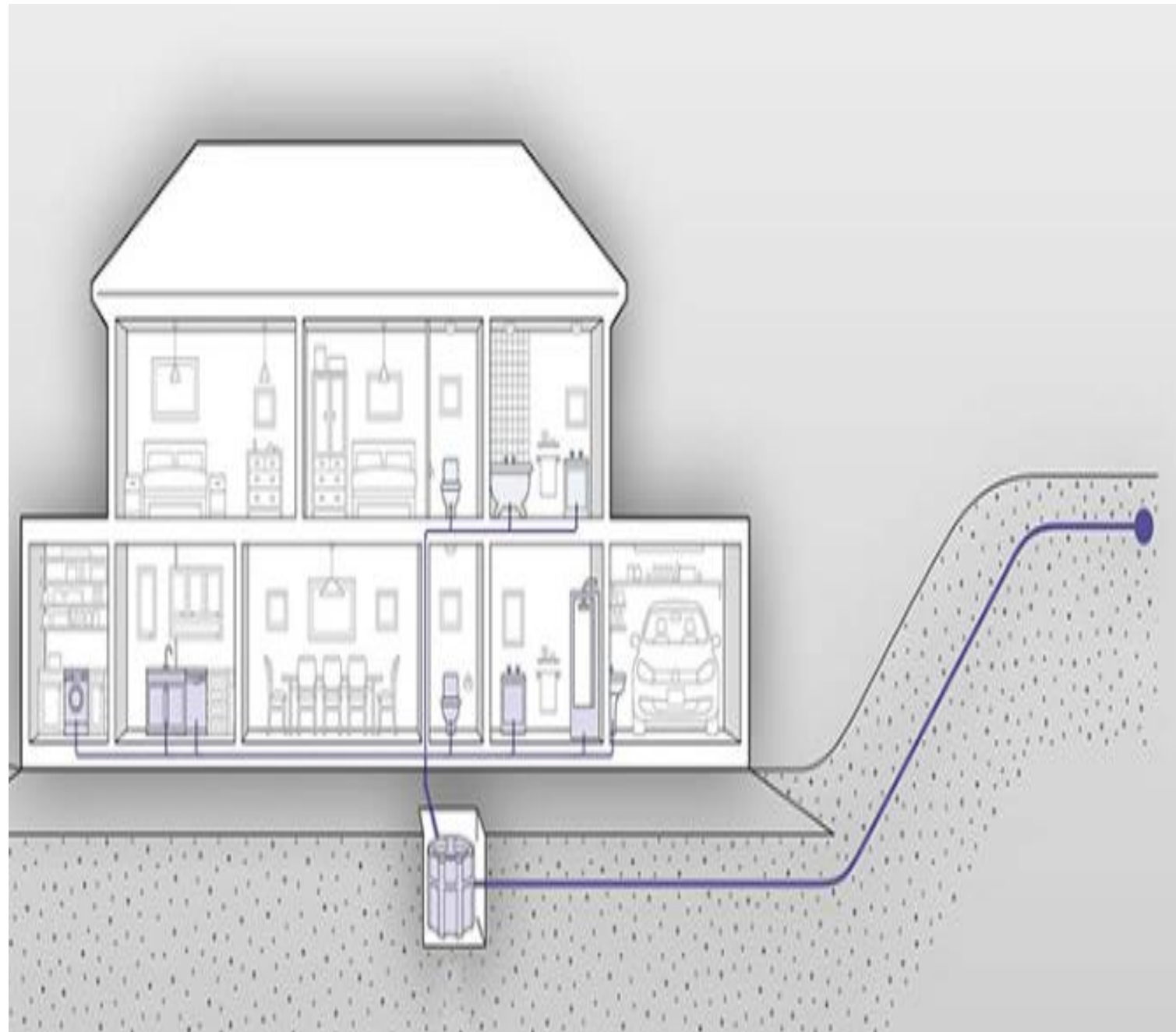


Lifting station

How they differ from small-bore macerators, grey water pumps, and lifting stations?

- Small-bore macerators ideal for adding a bathroom or ensuite
- Small-bore grey water pumps for under sinks
- Lifting stations are designed for multiple fixtures





Pumping principles and applications

- Waste from plumbing fixtures inside the building is discharged via gravity into the inground pump station
- Pumps inside the pump station activate at predetermined levels to lift the sewage upward through a pressure pipe system
- This is then discharged into the main sewer line.





How do they work?

- As mentioned, inside the pump station, there is a pump set
- Pump set is the term for all the components needed to makes things work
- Pump stations can be designed for sewage, stormwater, or wastewater (grey water only)



Rules and Regulations

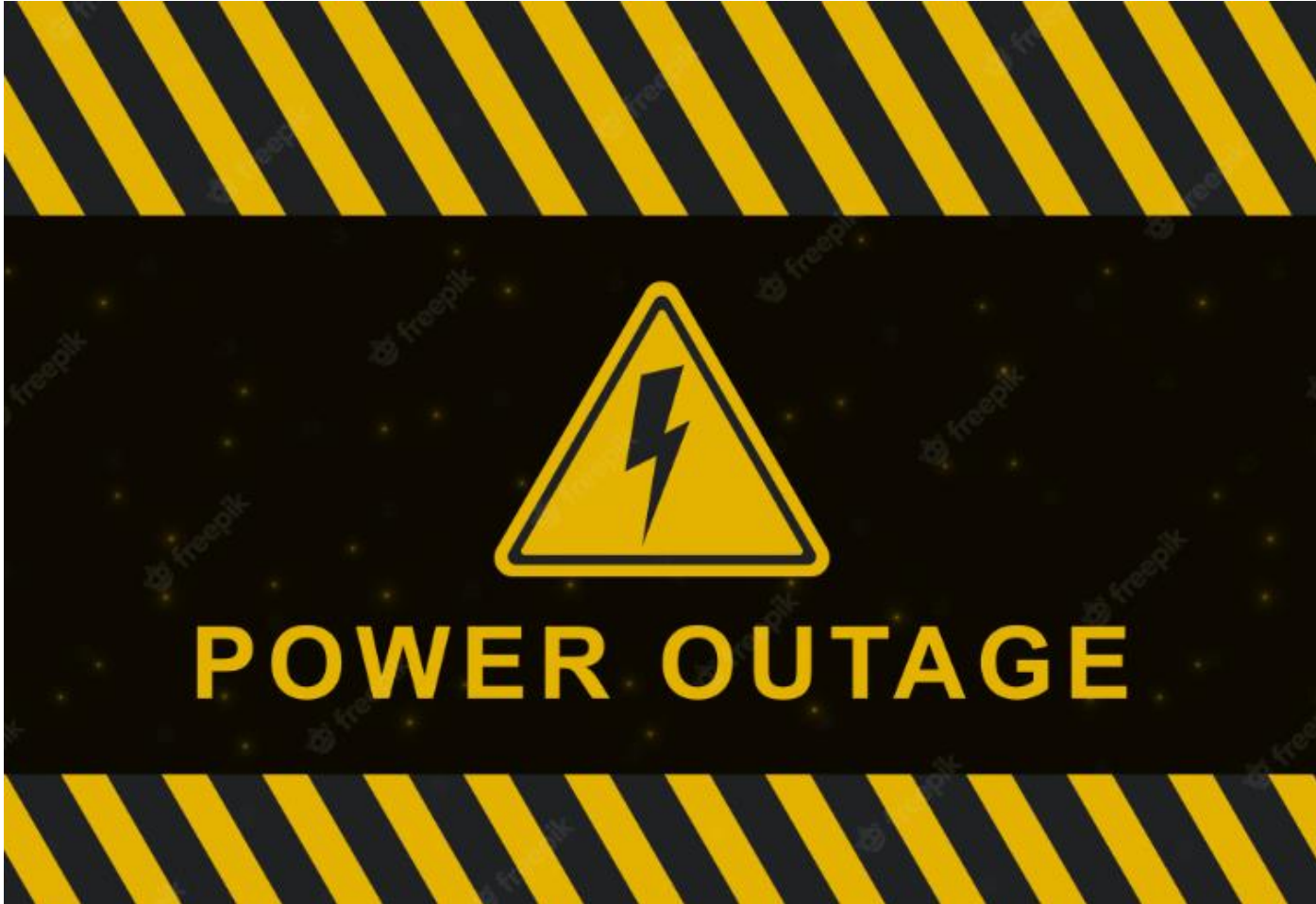


- No set Australian Standards in relation to pump station sizing
- Local councils may provide you with guidelines
- General rule of thumb is to allow 150 litres of waste storage per person per day
- Two person granny flat with a 600 litre tank would give approx 48 hours of storage if required



What if electricity fails

- Plumbing fixtures inside the building can continue to be used



What if a blockage occurs



- The waste inside the pump would continue to rise.
- High-level alarms would sound indicating a fault has occurred
- Plumber can be called to investigate fault
- Fixtures can continue to be used



Sewerage, stormwater and grey water



- Sewerage inground pump station
- Stormwater Inground pump station
- Waste water (grey only) inground pump station



Stormwater calculation principles

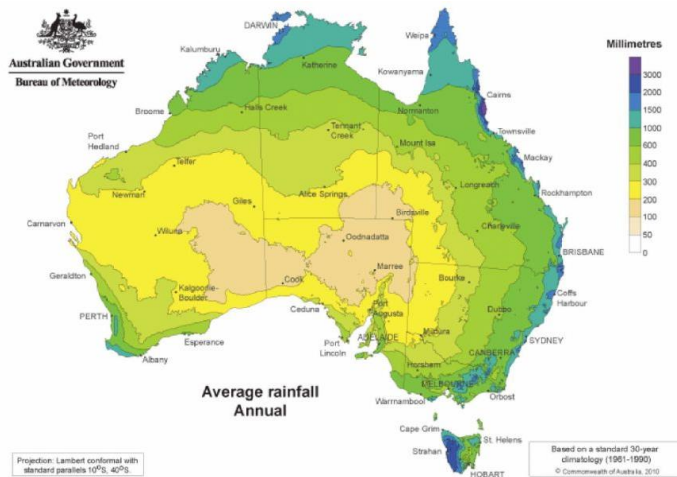
Rainfall Intensity

- Intensity/heavy rain is the depth of rainfall per unit time
- The symbol is “i” and the units are mm/hr @ cm/hr @ in/hr
- Rainfall intensity equation :

$$i = \frac{\text{Depth rainfall}}{\text{Time}}$$

$$\begin{aligned} \text{Volume, } V &= \text{Area} \times \text{Depth} \\ &= \text{m}^3 \text{ @ } \text{ft}^3 \end{aligned}$$

- There are specific regulations around stormwater and inground pump stations
- Larger catchment areas require much larger tanks so that there is a “working volume” for the pump



Solutions

Small 280 litre tanks

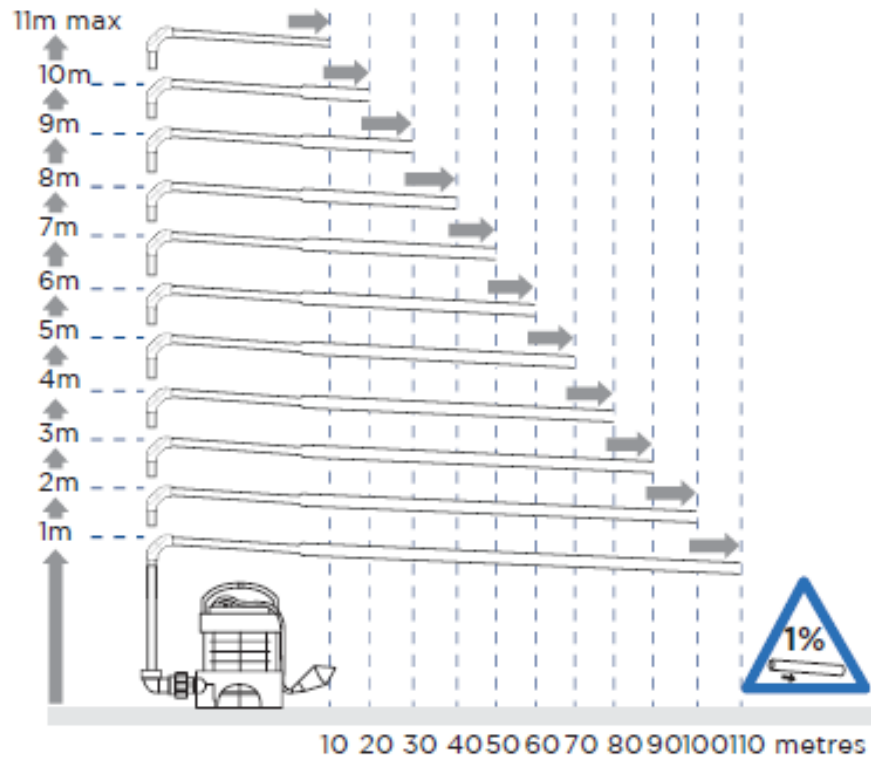
- Granny flats
- NDIS Home Modifications



Solutions

VERTICAL/HORIZONTAL PERFORMANCE

Increase size of horizontal run by one pipe size after 5m.
All horizontal pipework requires a minimum of 1:100 fall.



- Medium sized 610 litre tank
- Perfect for larger self-contained granny flat
 - Smaller homes
 - Tiny Homes



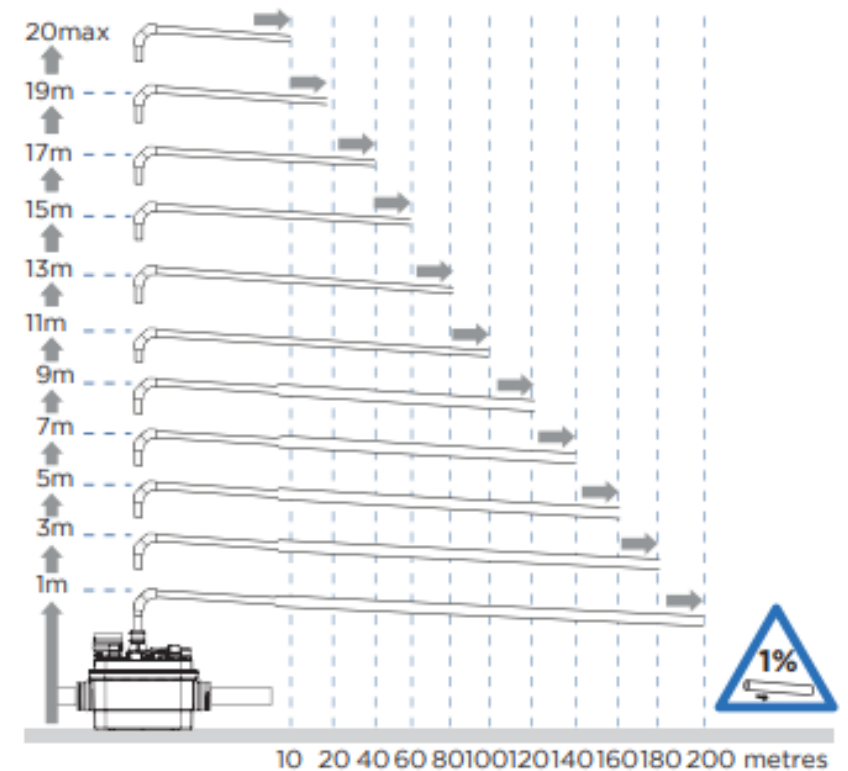
Solutions

1000 litre +



VERTICAL/HORIZONTAL PERFORMANCE

Increase size of horizontal run by one pipe size after 5m.
All horizontal pipework requires a minimum of 1:100 fall.





Australian Standards

- Tanks may be inground for up to 15 years or longer
- Test procedures not well known
- Tanks themselves must comply with AS1546.1:2008
- Tests are done to cover many areas
- With limited testing sites, onus is on manufacturers to ensure compliance



Case Study - Rectification

Location - Gold Coast Canal front home

Problem – Existing gravity drainage system failed

Solution – Inground Pump Station



Case Study – New Build

Location - Oatley, NSW

Problem – Duplex Construction

Solution – Inground Pump Station

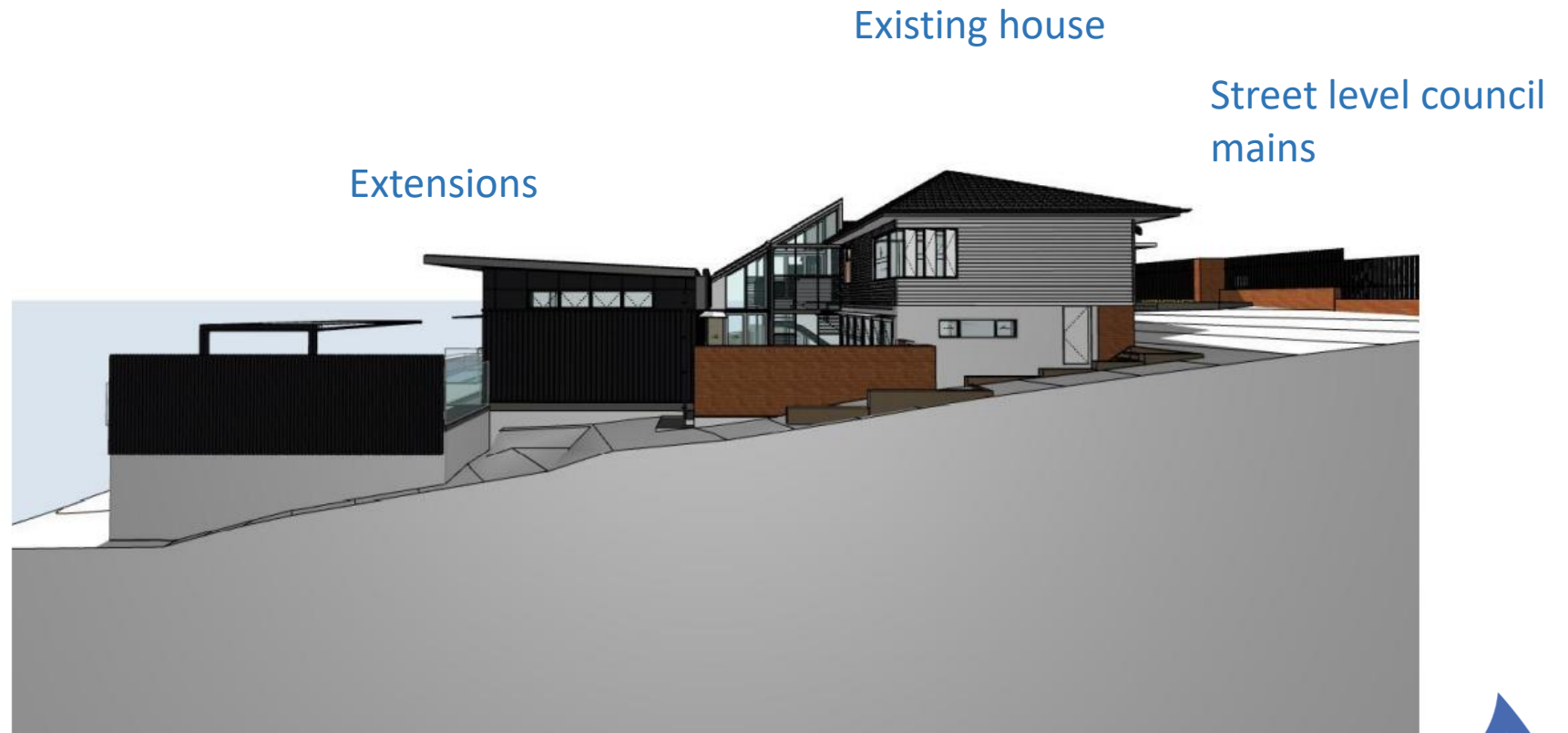


Case Study – Extensions

Location - Brisbane

Problem – House extensions

Solution – Inground Pump Station



Case Study – Addition

Location - Australia

Problem – Granny Flat below existing house drainage

Solution – Inground Pump Station



Other points

- Hydrostatic Uplift
- City/metro and country use
- Plumbing standards
- Pump covers/lids



Benefits of an inground pump station?



Provide waste storage in the event of power or pump failure



Cost effective solution



Low maintenance



Design flexibility



Sustainability





WHAT HAVE YOU LEARNNT?

1/. When would you specify an inground pump station?

A/. When a domestic swimming pool needs to be drained?

B/. To treat waste water for reuse as an irrigation system?

C/. When waste water storage is required in the event of power or pump failure

D/. As a pump selection for fire protection system

2/. What are inground pump stations used for?

A/. To receive waste from plumbing fixtures before transferring to existing drains or septic/treatment plants elsewhere?

B/. To transfer waste water from an office kitchen sink

C/. As a pressure recirculation pump

D/. As an irrigation pump

3/. For which project would you select an inground pump station?

A/. For a small, single hand basin?

B/. For a new granny flat built behind an existing house on flat ground?

C/. For a small A/C condensate pump?

D/. For a nail bar in a shopping centre?



4/. Why does my project require an inground pump station?

A/. The plumbing fixtures in the project are being installed below street level.

B/. It doesn't require a pump station as waste will flow downhill to open ground

C/. Homeowner is happy for the project to rely on a macerator to pump all the waste to street level.

D/. Waste from the fixtures will defy gravity and flow uphill to street level.

5/. Why is accessibility a major issue when incorporating conventional plumbing systems?

A/. Traditional plumbing may have been installed in wall cavities or under floors with post-tension reinforcement therefore making them inaccessible.

B/. Council regulations don't allow access

C/. The existing plumbing is normally easy to locate and making modifications for conventional plumbing connections

D/. Issues with conventional plumbing systems can be repaired remotely

6/. How might conventional plumbing limit design possibilities for architects.

A/. Conventional plumbing provides endless possibilities for designs of wet areas locations.

B/. Council regulations don't allow changes to buildings.

C/. They restrict the placement of wet areas, like bathrooms, kitchens, and laundries to specific parts of buildings, and therefore prevent architects from using these spaces in other ways.

D/. Conventional plumbing is the only real way to achieve flexibility in design.

7/. In what ways does conventional plumbing limit where items such as sinks, showers, and toilets can be placed?

A/. Your customer will be satisfied with a design that doesn't meet their requirements.

B/. Too many fixtures can cause too much load on the pipes

C/. It doesn't, conventional plumbing allows fixtures to be installed anywhere.

D/. Because drainage is typically dependent on gravity, sites for these items need to be above (and in close proximity to) the sewer line.

8/. In what ways can new plumbing technologies potentially introduce a new way of plumbing?

A/. Best to continue with existing practises and not try new ones

B/. Old technologies are the way forward

C/. They can reduce labour time and costs, and expand the possibilities in terms of bathroom, kitchen, and laundry locations.

D/. New plumbing technologies are difficult to install and can add a huge amount of time to the project

9/. Your current project is to design a family home on a new land development. The block of land your client has purchased slopes away from the council mains located at street level. Do you?

A/. Advise your client that they will need to use plumbing facilities at the neighbour's home across the street?

B/. Suggest that all waste from the house can be drained to open land further down the development?

C/. Use a macerator, as a simple and cost effective solution?

D/. Use a large inground pump station to accept the waste from the house and pump up to council mains at street level?

10/. A new client has approached you about a fully self contained Air BnB extension they want to add to their existing home. They don't want strangers coming into their house if there is a power outage. Do you?

A/. Tell your client to find a different block of land?

B/. Specify an inground pump station with sufficient waste storage capability for a couple of people?

C/. Tell them strangers aren't too bad and they'll soon be lifelong friends?

D/. Advise the guests there are public facilities they can use at the park across the street?

THANK YOU - ANY QUESTIONS?

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