Water wise – Efficiencies and best management practice

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Challenge of water shortage

- EPA Water Abstraction Notice
- Well maintenance
- Well drilling
- Efficient use
  - Overhead 20-40% of water applied is retained in pot
  - Inefficient waste 50-80%of the water applied
- Management to be more productive with irrigation
- Budgeting – measure your use, season

- 65% of Europe’s drinking water comes from groundwater
  - 11% in Ireland from ground water & 83% from surface water
- 60% of European cities overexploit their groundwater resources
- Area of irrigated land in Southern Europe has increased 20% since 1985

Water Abstraction Registration

- EU Water Policy Abstraction Registration Regulation 2018
- Register use of 25m^3 a day or more
- Includes rivers, lakes, ground water, wells and boreholes

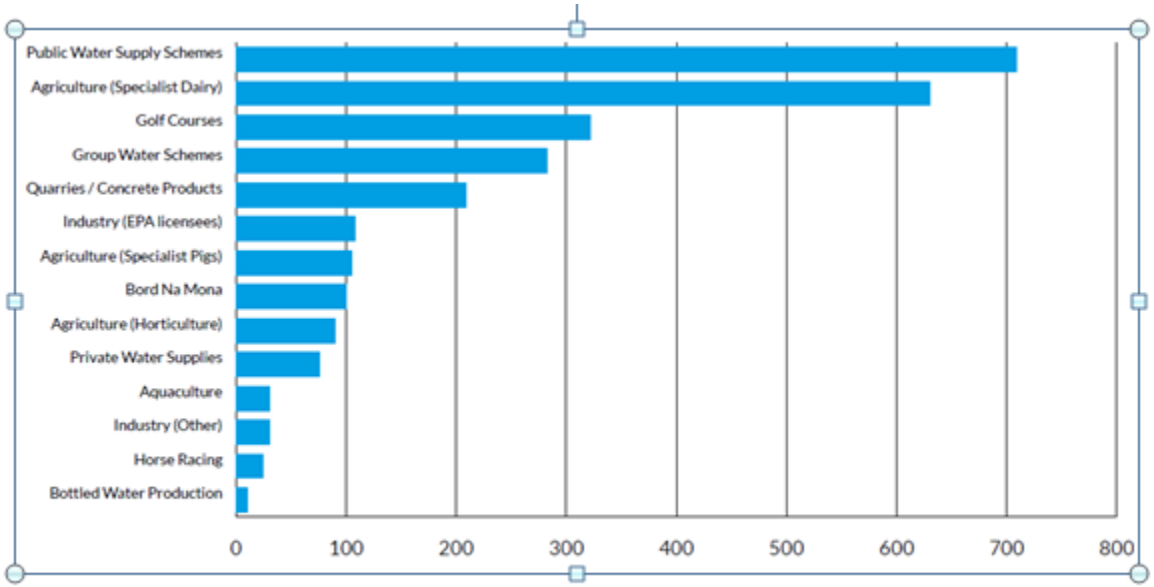
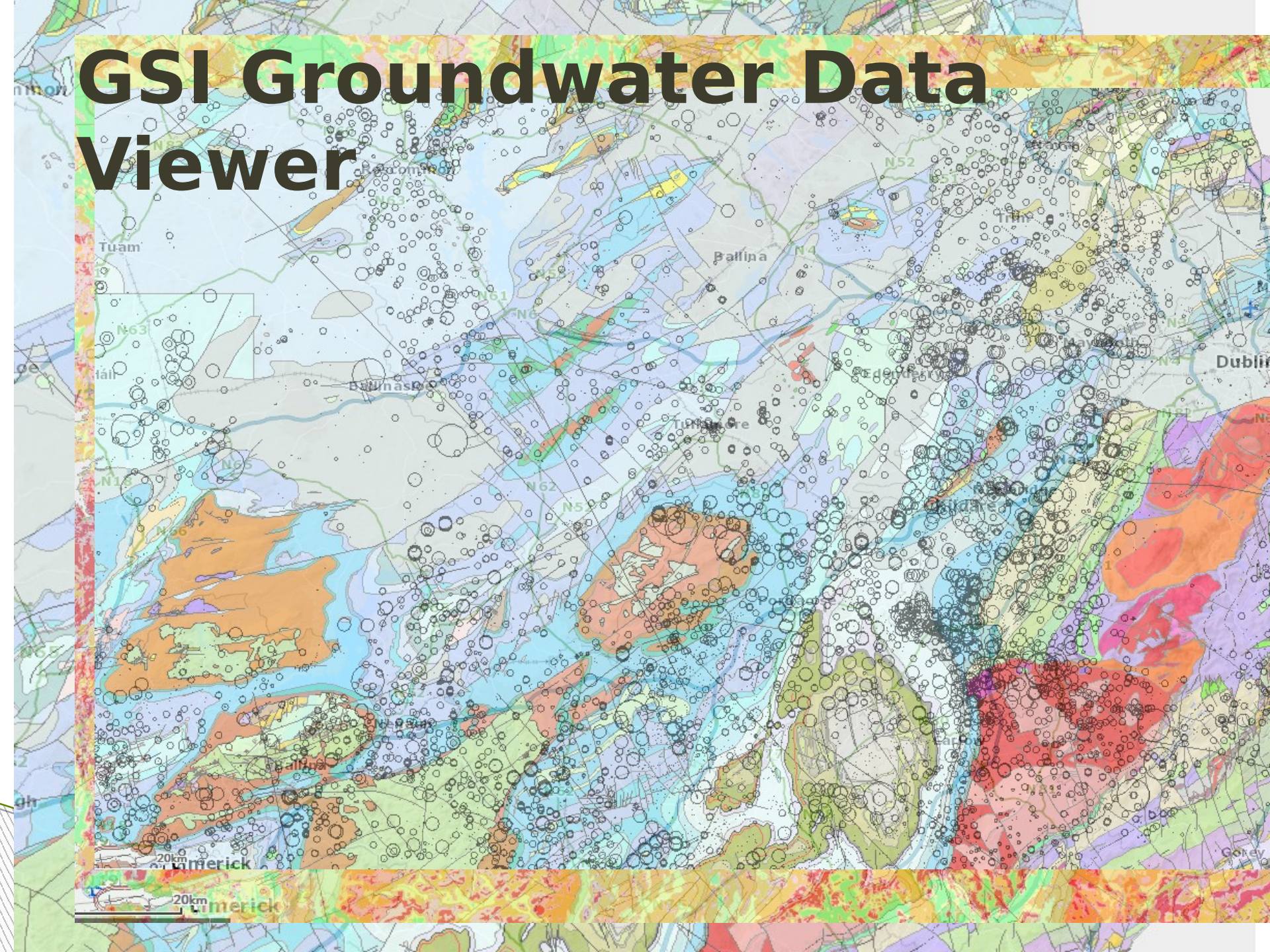


Figure 1: Estimated number of abstractions above 25 m^3 per day by industry/sector (DHPLG, 2018).

Water Abstraction Registration

- Management of water resource
- Protect vulnerable groundwater and surface water bodies
- Basic information on the abstraction location(s),
  - which can also be determined using an interactive map; maximum daily and annual abstraction volume; abstraction type and purpose / use are captured. If the abstraction volume is less than 25 m^3 per day, the registrant will not be allowed to register the abstraction.
- Plan *not to publish* a detailed public abstraction register

GSI Groundwater Data Viewer



Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

Groundwater Data

Legend

Groundwater Wells and Springs

- Groundwater Wells and Springs

Bedrock Aquifer Faults

- Bedrock Aquifer Faults

Bedrock Aquifer

- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones

Scale: 1:25,000

Geological Survey Ireland

N W E S

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Map Centre Coordinates (ITM) 615,056 660,874

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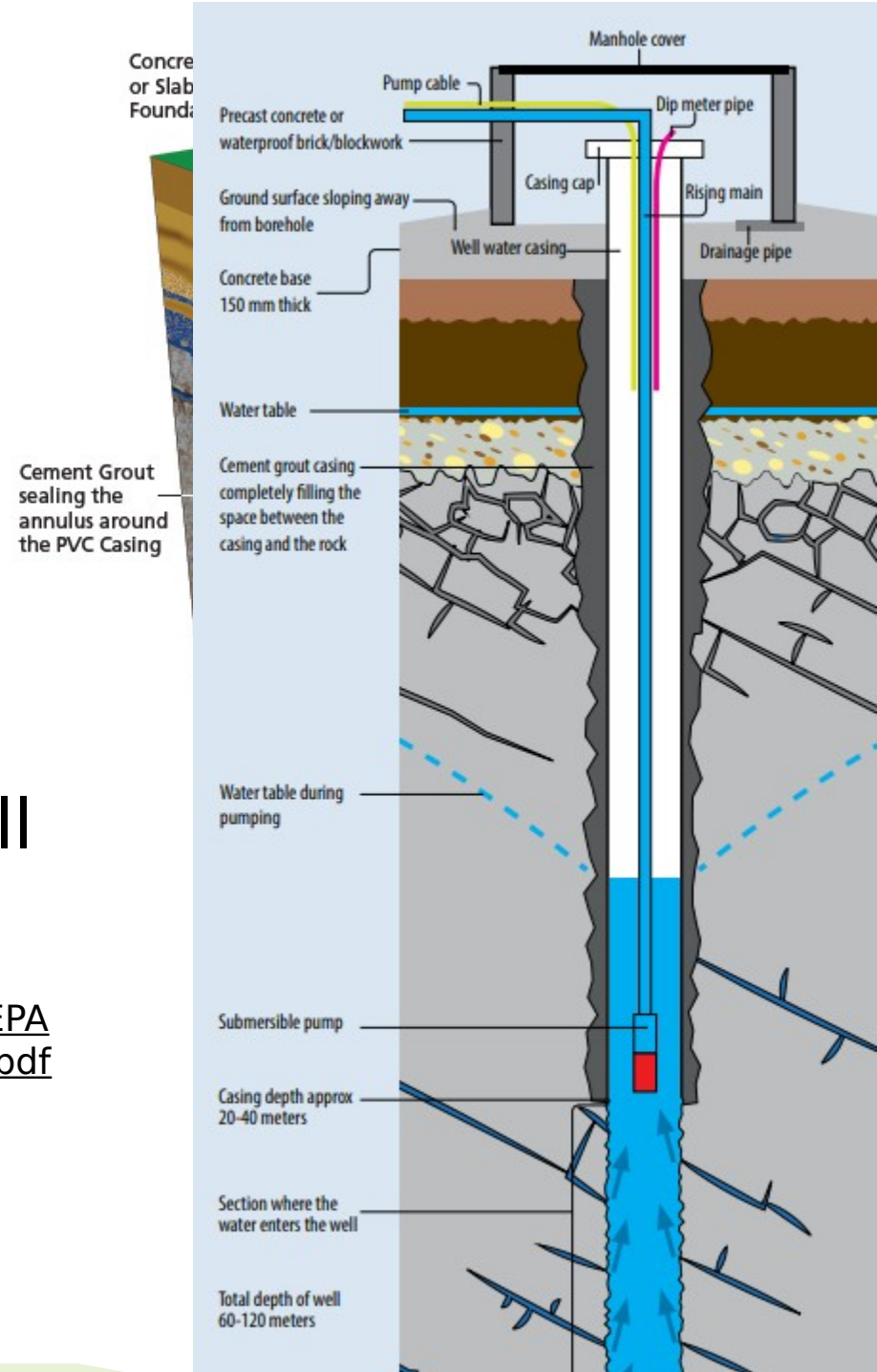
Well drilling

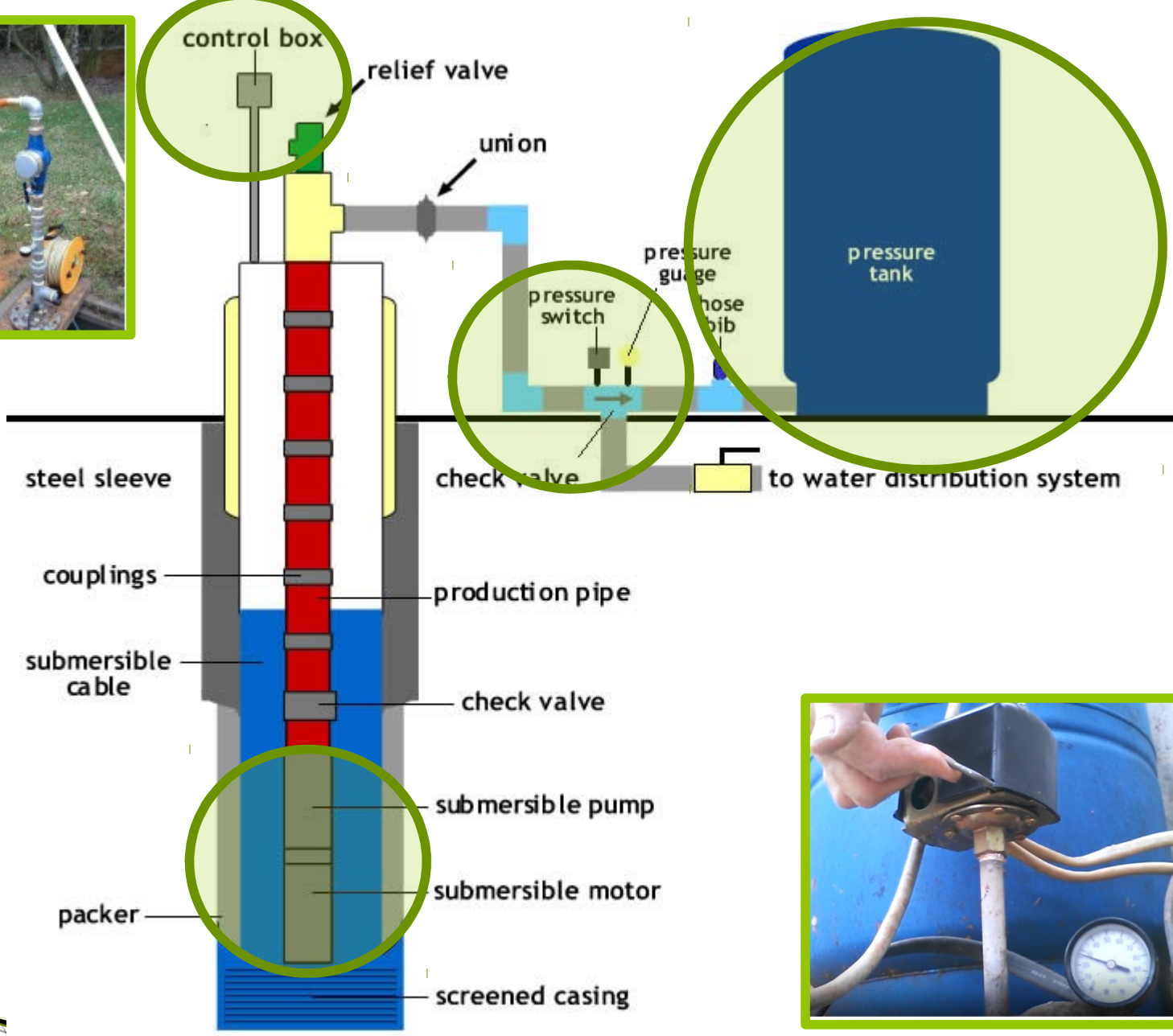
- Sample costs
  - 60m depth
  - 15cm bore hole
  - €5,000
  - Pump house, well head excluded
- EPA drinking water well drilling guidance
  - https://www.epa.ie/pubs/advice/drinkingwater/EPA_DrinkingWater_AdviceNoteNo14b_web.pdf



Pump maintenance

- Modern pumps designed to run 24/7
  - Run pumps at lower volume will extend their life and improve water table recharge especially important where multiple wells are nearby.

- Check if the pump is cutting in and out regularly or too quickly
  - This could be a sign there is a leak in the water supply or a leak in the pressure vessel. The pressure vessel should be sized appropriately for volume of water required daily
- Check the pressure switch.
  - The contacts in the switch can become worn or corroded over time, which prevents them from performing their function and turning the pump off when adequate pressure is built up
- Is the pump is overload in the control box is tripping regularly
  - could be a sign the capacitor is weakening and needs changing (replacement cost c. €15) or that there is a short circuit.
- The electric cable supplying the pump should be held securely and not at risk of fraying overtime. The pump should be suspended using 6mm-10mm chord.
- Where the water in a well is at risk of running low at times probes can be connected to the control box. They will first give a warning if water supply is running low and if it drops below a very low level the pump will switch off. An alternative cheaper option is a loss of prime pressure switch. This means that the pump will not be running constantly and at risk of burning out.
- Where there is a lot of iron or manganese in a well, pump heads should be cleaned every 6 months to a year. Cleaning the head regularly helps avoid damaging the pump.


control box
relief valve
union
pressure gauge
hose bib
pressure switch
pressure tank
steel sleeve
check valve
to water distribution system
couplings
production pipe
submersible cable
check valve
submersible pump
submersible motor
packer
screened casing

Well maintenance

- Air blast
  - Remove silt, grit etc.
- Iron oxide build-up
  - Removal with organic acids
- Shock disinfection
  - Sodium Hypochlorite
  - EPA guidance

Shock disinfection -*EPA guidance*

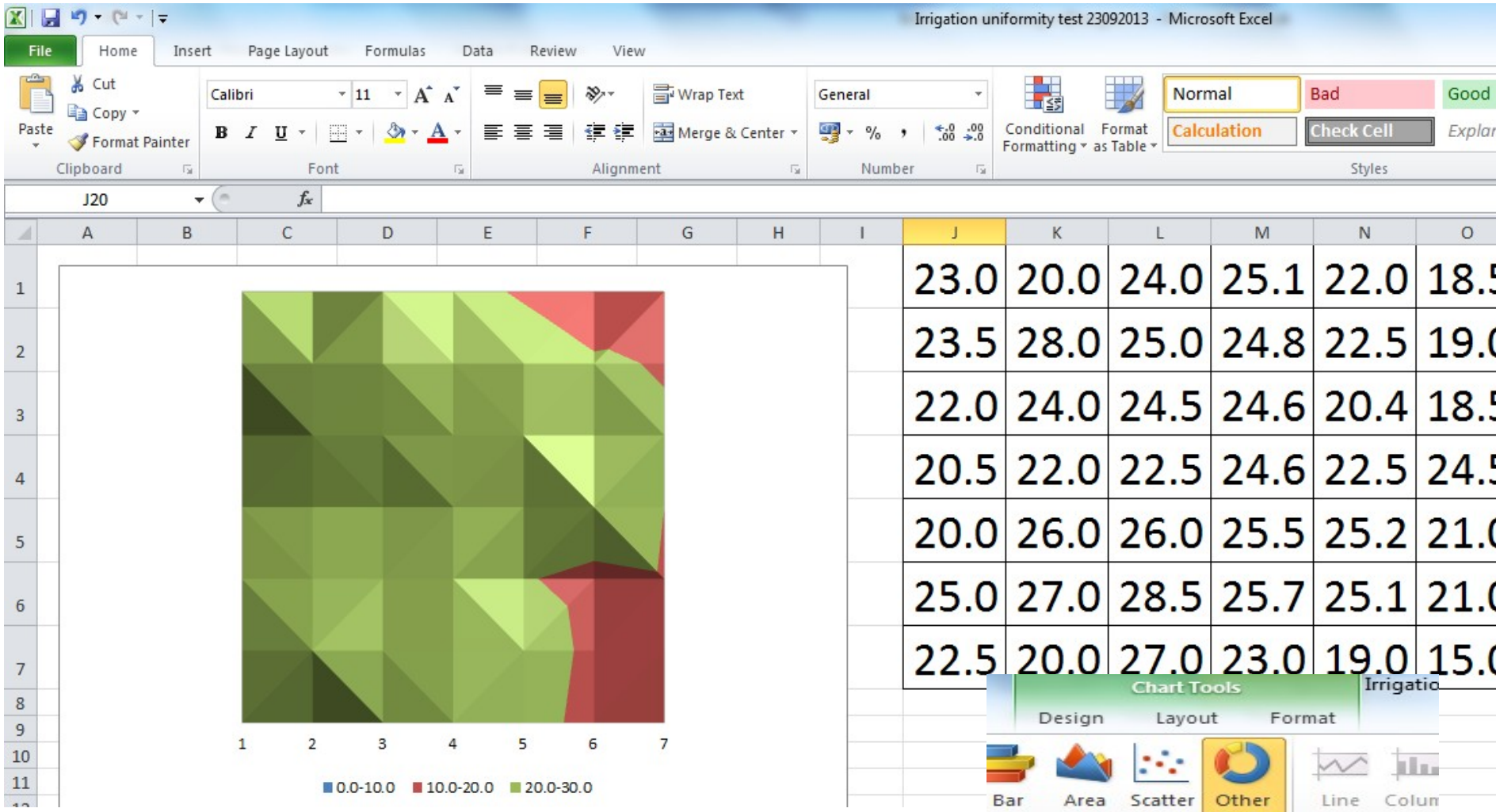
- This method is for the disinfection of a well water supply, water storage tank, water carrying pipe work and hot and cold-water cylinders. Approximately 1,100 litres of water will be used.
- *Caution: if you have a filter or any other type of water treatment on any part of your system, consult your supplier before following this procedure. Heavily chlorinated water may affect the filter or the chlorine may be absorbed by the filter rendering the procedure ineffective.*
  - 1. To 25 litres of water add 5 litres of a 1% w/v solution of Sodium Hypochlorite. While we do not endorse any individual products, any one of the following products may be used diluted in 25 litres of water.
  - (a) 2.5 litres of Milton fluid (or 50 tablets) or similar products with 2% w/v Sodium Hypoxhlorite.
  - or
  - (b) 0.5 litres of Sterichlor or similar products with 10/11% Sodium Hypochlorite.
  - Disinfection products sold for use on the farm will be acceptable for use in disinfecting wells. However, it is important to seek advice about their use and it is advisable to always use the products in about 25 litres of water.
  - 2. Pour half of the solution into the well.
  - 3. Turn on the drinking water tap in the kitchen and let the water run until there is a distinct smell of chlorine from the water. Then turn off the tap.
  - 4. Turn on all other taps and let the water run until there is a distinct smell of chlorine from the water. Then turn off the taps.
  - 5. Pour the other half of the solution into the well. Turn off the well pump and ensure that the well is covered properly. Allow to stand overnight or for at least 8 hours.
  - 6. After at least 8 hours reconnect the pump. Turn on all taps and let the water run until the smell of chlorine is gone. Turn off all taps.
  - 7. Arrange for the water to be tested.
  - *N.B. This method is only suitable as a once off shock disinfecting procedure and cannot replace a proper treatment system if your water supply needs continuous disinfection*

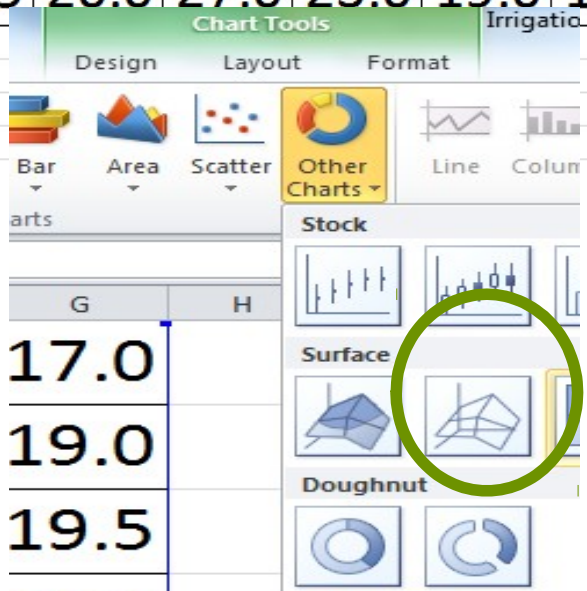
Irrigation uniformity

- Overhead irrigation uniformity varies
  - Wind
  - Pressure
  - Blockages
  - Design
  - Crop canopy
- Measure

BMP for efficiency of overhead irrigation

- Mean application rates <25mm/hr
- Uniformity >85%
- Scheduling coefficient <1.5





This example
Application rate 89.8mm/hr
Uniformity 54%
Scheduling coefficient 3

Scheduling irrigation

Feedback

- Plant physiological measurement
  - Heat & stomata closure
  - IR camera

Feedforward

- Rain sensor
- Moisture loss
  - Plant + pot weight
  - Evapotranspiration
  - Crop coefficiencies and potential evapotranspiration
- Moisture sensor
  - 80% water saving in Hilliers nursery in 2012 sensors used to activate irrigation v human decision
  - Multiple sensors for reliability
- Light intensity


10HS
DECAGON DEVICES


HORTAU


HCC
Hydrawise™ Wi-Fi controller
for high-end residential
and commercial market
Hydrawise-ready
CONTROLLERS
HCC metal cabinet
6 to 54 modular stations
HCC plastic cabinet
8 to 38 modular stations
ICC and ICC2 retrofit
8 to 54 modular stations


Hunter

Short cycle - pulsing

- Maximum absorbable rate of 15-25mm/hr
- Water holding capacity is low but moisture deficit is high
  - Multiple short irrigation cycles will minimise run through/ waste
- Check run through efficiency
  - Plastic bag to line pot in pot, run irrigation, allow to drain, excess = waste
- Pulse irrigation
  - 25-50% on:off ratio
  - 3 applications 5mm with absorption time between them

Capital investment

- Supply
  - Well and rainwater harvesting
- Storage
  - Tanks, under new structures,
  - Lagoons, tanks & Covers
- Treatment
  - Filters, UV, chemical treatment
  - Disease prevention
- Irrigation methods
  - Drip
  - Gantry
  - Capillary

Action points

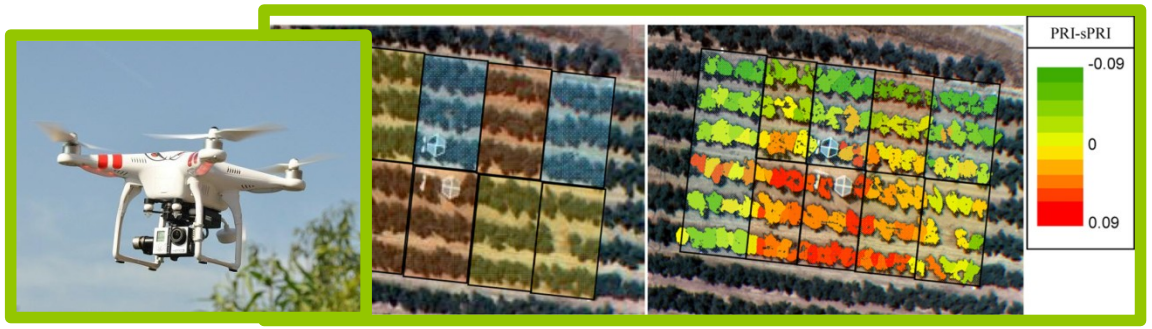
- Accurate measurement of water use
  - Variety of crop systems and stages
- Scheduling irrigation
  - Reduce labour and better plants
- Check water quality regularly
- Back up & servicing
  - Maintenance plan
  - Action during low water demand

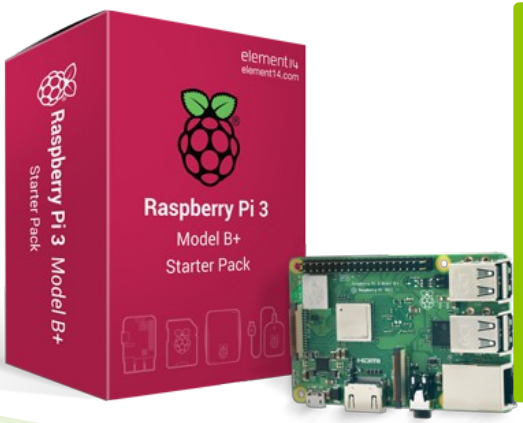
Future

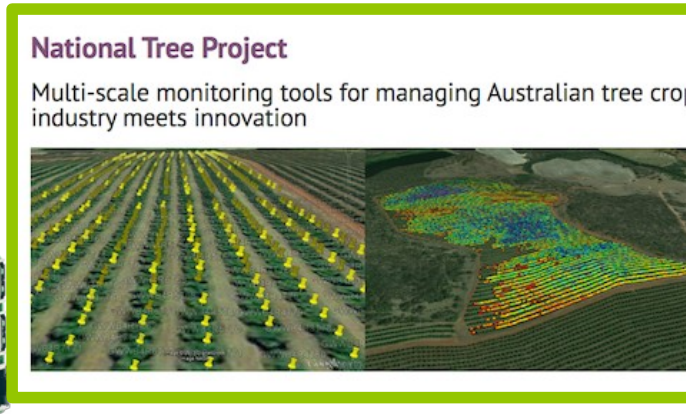
- Abstraction Registration
- Water capture and reuse
- Climate change
- Plant sales
  - Public buy in, autumn planting season
  - Landscape contractors,
  - New planting options; not all grass is green

Future

- Big data
- Infra red/thermal imaging cameras, drones, weather sensor
  - Publiclab.org simple home made options







Resources

- Fertinnowa – Fertigation bible
- Nursery & Garden Industry Australia NGIA
  - Nursery Industry Water Management Best Practice Guidelines *http://www.ngia.com.au/Section?Action=View&Section_id=556*
- AHDB

Thank you for your attention