General Practitioners September 2021 Newsletter

Welcome to our third newsletter for 2021 and our last issue before committee elections. For those who don't know me I have been working as Secretary since the EGP Group was formally established, setting up the website and Slack channels and as editor of the newsletter, although Tamlyn Adams has recently been doing a great job of pulling the newsletter into shape – thanks Tamlyn!

I am stepping down this year to allow some fresh faces to make a contribution. If would like to take an active role in our Special Interest Group I would highly recommend standing for election – there is much to be gained personally, professionally and collectively (see *Why I Volunteer* by Julie Elliott later in this issue).

Bruce Tricker, Secretary and Editor

In this issue:

Message from the Chair

Last newsletter I started 'Hectic – That's about it.'

Now it's a little like ground hog day. Back in lockdown. This time is a little different for me - I have stopped giving myself a hard time about keeping the work rate up. This time we are facing a tougher enemy in the Delta variant. I think NZ has again responded well. Looks like our Southern members will now be back to full work in the construction industry earlier than those of us north of the Bombay Hills.

Things in the engineering world continue to be fairly hectic. MBIE is rolling on with the changes to engineering registration regulations; NZS3603 and NZS3604 revisions are getting closer; the world of EQ design is continuing to develop; Engineering NZ is providing more and more online training opportunities and with our own SIG working on a number of tools for GP engineers with Martin Pratchett it is very busy.

And the building industry rolls on with construction rates showing every sign of accelerating even more.

An update on the SIG's work:
We continue to be actively involved in representing the interests of EGP's as new regulations are developed. Our intent is to make sure that the field of General Practice continues to be recognised as vital.

SESOC conference:
The EGP SIG had a very successful conference and we received excellent feedback on the part we played. I was especially chuffed to have Michelle Grant, SESOC president, express the view that she was now convinced that as well as being a Structural Engineer she could see that she is a General Practice Engineer. Gordon Hughes and Ian Watson gave excellent presentations - Gordon on Human Factors in Structural Engineering and Ian on how to navigate the risks and adversities that can happen. Martin Pratchett presented a paper on documentation and our breakout session went well despite losing two speakers because their flight from Wellington was cancelled due to the heavy Hamilton fog. Gordon and Kelly Pilkington from Hamilton stepped in to talk on small office practice along with an excellent presentation from Craig Lewis, CEAS, on the legal implications of various elements of engineering practice. Alasdair Sinclair presented some notes on the differences between commercial and residential detailing and this was capped off by the Q&A style presentation that was run exceptionally well by Julie Elliott. It was good to see two young engineers, Hawk Couper and Anthony Cook, step forward to share their thoughts. Our thanks go out to all who were involved – an excellent debut for the EGP SIG on this national stage.

Martin continues to work on various resources. The latest involve the forward program of webinars that the EGP SIG is sponsoring along with others; a set of basic guides to help ensure we don't miss things as we move through a design project; the recently released active documentation tool that you can use when starting a project (you set it up once and all the documents you need are generated and populated with the base information ready for you to do the work).

The committee elections are coming up and we will be looking for nominations towards the end of September with voting in October. Up till now the committee has served for one year but have found it quite disruptive to keeping the momentum going. This year we will be looking to have a two-year term taking the next election out to 2023. We are looking for nominations from across the country with as much diversity as possible. Please consider standing – and don't think that because you are a sole practitioner you don't have much to contribute. In my experience sole practitioners have lots of ideas and show versatility in solutions.

After the elections we aim to set up a roadshow to meet with general practice engineers from around the country. We would like to promote local groups and get feedback on what is

important to EGP's. The original idea was to coattail on the CEO's roadshow. Covid lockdown put a stop to that but all being well, November will see us back in level 1 and able to travel.

Lastly, I want to thank the committee for their sterling work in promoting the part that EGP's play in the pantheon of engineering work.

Pete van Grinsven

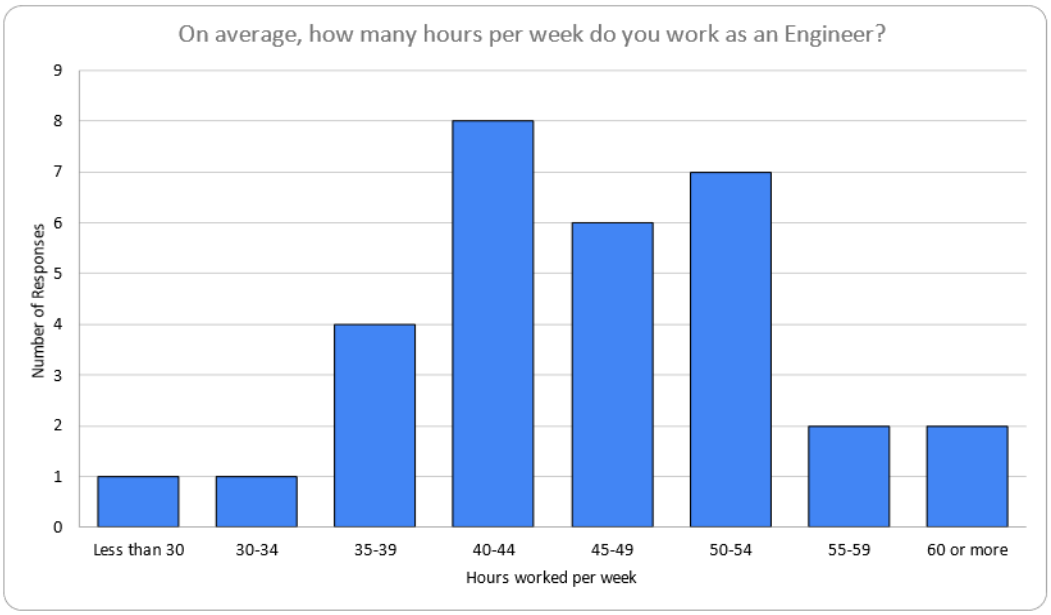
The EGP One Question Survey

This issue we are asking Engineering General Practitioners:

Do you think that newly graduating engineers are adequately prepared for a typical graduate role in the workplace?

Take Survey

In the last issue we asked how many hours per week do you work as an Engineer. Here are the results:



Over 80% of respondents said they work 40 hours or more per week on average.

Expansive Soils – A Field Observation

David Buxton, Geotechnical Engineer

Below is a photo of something I noted while out and about last summer. I thought it was a good visual example of expansive soils. In NZ we primarily get damage from summer shrinkage (expansion/heave problems are much rarer). To the left is a small group of wattle trees from Australia – they can handle dry conditions very well.

The cracking in the road is from settlement occurring in two arcs, probably correlating to the effective zone of the tree roots. The outer ring is at a distance of about 75% of tree height. I would visually estimate settlement of 40mm to 80mm and it is notably abrupt to cause some sharp differentials. The soils are likely to be clayey alluvials. It's good to imagine the corner (or side) of a house crossing over this zone and the effect it would have. The photo was taken west of Whangarei.

Learning opportunities

The biggest opportunities to learn from are not when things go right, but when they go wrong. The best way to learn from your mistakes is to recognise what went wrong and how you (and others) can avoid making the same mistake again.

Click on the links below to read some anonymous Learning Opportunities submitted by two different contributors:

- Failure of a temporary retaining wall during construction
- Failure of cantilevered concrete stair treads during construction

Do you have a learning opportunity that would be of interest to your fellow EGP members? Download the Learning Opportunities form here and send it to egp.sig.anonymous@gmail.com

Why I Volunteer

Julie Elliott

My name is Julie Elliott; I am a committee member with Engineering General Practitioners. When the first murmurs of the group were discussed in 2019 at my local networking meeting (Rodney Engineers Group) I thought it was worth putting some time into the cause. As a young engineer, although holding my CPEng recognition, I was not actually signing off documents due to how the company I worked for was structured. However, I could see the issues that others were facing and were discussed frequently at meetings. I knew the benefits of the networking group I was part of and felt the smaller practices voices were not heard in the bigger picture of our engineering industry. Not knowing or being able to have input was making me nervous about my future career.

I'm a bit of a serial volunteer; in the past I have spent time volunteering for other, perhaps not so influential organisations, Hibiscus Coast Parents Centre, our local Kindergarten, repeat offender (volunteer) at the local school gala and of course the local regional park has tree planting days which I have taught my daughter to love (if not only for the sausages at the end).

Some of the benefits from all these roles are similar, you meet a great community of likeminded people, people that like to action change for the better, people that are prepared to put in the extra work to make the difference, people that encourage and support you to extend your comfort zone (for me this was public speaking in front of large groups).

Volunteering with EGP also has unique benefits; perhaps similar to volunteering for any engineering group; it has a positive impact on my career, giving me exposure to a large audience of peers to share/gain engineering knowledge with, gaining a greater understanding of the bureaucratic structure and the reasons why change is often so delayed and the easy grab of some extra relevant CPD hrs.

As an EGP committee member the saying of “you get out what you put it” could never be truer. The commitment level is relatively flexible with meetings around every 6 weeks (which are mostly carried out via Zoom) and from there you offer to action tasks (which often you have suggested). It is a very fulfilling feeling having your suggestions come to fruition and impact a much larger reach of people than you had ever imagined.

With our election for the coming year just around the corner I would suggest to anyone that is interested to put yourself forward, step up and get involved – you won’t regret it!

Value Pricing for GP Engineers

Gordon Hughes

What is value pricing? ‘Value-based pricing is a pricing strategy where the price you charge is determined by the value you create.’

Why should I think about using value pricing? We are knowledge professionals, and we can often use our skills to help create value for our clients.

Why should we use value pricing rather than other pricing methods? Value pricing rewards for creating value for clients and while more difficult and time consuming when successfully implemented yields much higher returns to the practice.

There are a range of pricing methods and include:

Charge Up Hourly Basis or 'Cost Plus' This method is widely used especially in the legal and accounting professions and also by engineers. A major disadvantage is that Clients do not know what the cost is likely to be at the time of purchase and often leads to disputes about fees. Major difference in costs depending on the experience and skill level of the practitioner. Times to do a task can easily vary by 300%. Most clients dislike this method of procurement for consulting engineering services

With value-based pricing, you start with the customer’s needs. The actual service comes last-only once you’ve discovered the value your client wants and your ability to deliver on it. Once you discover the value you can create for your client, you can price based on value.

With cost-based pricing, you start with the product. You price the product based on how much it costs to produce.

Percentage value of the project. This used to be how all projects were priced and when I commenced work there was a scale of fees with fixed percentages of the project engineering costs for various type of engineering projects. This method using set scale of fees was outlawed in the Rogernomics era. Some firms still use a percentage fee which for structures is usually around 2%. The rate in the 1960-70’s was 5%-7.5%.

Commodity Pricing For example a given fee per beam, portal etc.

Fixed Fees or Lump Sums Usually most popular with clients. They require clearly defining the scope of work before commencing and a provision that covers additional fees for scope changes. These can be used with or without value pricing

I have found a mix of pricing methods to be practical for my engineering general practice.

Value Pricing requires a fixed fee and I have found results in greater client satisfaction, better returns and few, if any, write offs or bad debts.

This is not always applicable for all commissions: for example, in investigations into failures or collapses the scope cannot be well defined or foreseen prior to commencing work

So how do we implement value pricing in engineering general practice?

Most textbooks and published references use examples for the accounting and legal professions. I have set out a couple of simple examples that I have used for value pricing.

Speed of services. Clients value a short turn-around period and high standard of service. I have found that they are often prepared to pay considerably higher fees for this value. Several of my Architectural clients have told me that my fees are a lot higher than others, but they engage us because of the value they place on good service and quick turn-arounds

PS4's -These have different values for different clients at different times. While they are almost always required by the consenting authorities they can have a wide range of values. There is a higher value if a client needs Code Compliance to enable a chain of value enhancing transactions. I have found that fees ranging from a minimum of $300 to more than $1,000 can be achieved when looking at value to the client

All these methods require good communication with the client and a clear understanding of the value that we can create

I hope this brief article will encourage a wider use of the Value Pricing Method.

A good reference on value pricing is 'Implementing Value Pricing' (Wiley Professional Advisory) by Ronald J Baker

Soak Pit Calculations – Suggestions for Improvement

Gavin Tippett

As a sole practitioner living in Wanaka, I work mostly on smaller residential projects. Part of my day-to-day work is the assessment and sizing of stormwater soak pits. I also do some work in the closely related stormwater runoff sector, generally for rural type sub-divisions and hazard analysis.

NZBC vs Queenstown Lakes District Council

For both of these types of work, I use both the Queenstown Lakes District Council (QLDC) Land Development and Subdivision Code of Practice (2020) and the New Zealand Building Code (NZBC) Section E1 – 'Surface Water' (2020, 1st edition, amendment 11). The main reason for using the QLDC Code of Practice is due to it having robust design guidelines for onsite stormwater disposal.

I find the NZBC 'Surface Water' document very useful for determining runoff and refer to it for many jobs when calculating this. However, it is not perfect, especially when dealing with onsite stormwater disposal. I have found that the method for calculating soakage rates (Section 9.0.2 of NZBC E1) is somewhat lacking in several important areas.

The method requires excavation or boring of a hole 100mm to 150mm in diameter to the depth required for the base of the soak pit, filling with water and then measuring the rate of water level drop over time. Sounds simple, but is it too simple?

Issues With Calculations

In this calculation there is no allowance for:

1. The depth of the hole.
2. The diameter of the hole.
3. The shape of the hole.

All of these variables change the surface area through which the water can permeate into the soil, which leads to a wide range of soak rate results.

I tend to use the constant head method prescribed in Appendix G of AS/NZS1547:2012 'On-Site Domestic Wastewater Management' in almost all assessments. This method measures the Ksat of the soil and takes into account the dimension factors mentioned above. (Ksat calculated using the equation G1 shown in AS/NZS1547:2012 Appendix G.)

This produces repeatable results, within the margin of error from small variations in measurements, even if the hole dimensions are changed. I have tested this on several different sites and found the calculated values very closely match each other.

Unconservative Results From NZBC E1

I have been involved in two projects where soak pits (designed by others using the method in NZBC E1) have failed to accommodate even moderate rainfalls. Investigation using the constant head method showed that, in one case, the soak rate used for design (based on NZBC E1) was approximately 300 times higher than the constant head method produced, thus resulting in soak pits that were far too small for the site.

Further to this, there is no allowance for climate change (higher intensity rainfall events), clogging (due to normal inflows of fine sediments and/or lack of maintenance of either the soak pit and/or any pretreatment sediment traps) or longer duration rainfall events. The NZBC required event level is an annual exceedance probability (AEP) 10% 1 hr event.

Preferred Design Guidelines

The QLDC Code of Practice requires that the worst-case scenario is used for climate change (RCP 8.5 2081 - 2100) for an AEP 5% 1 hr event and a 0.5 reduction factor for clogging (i.e. use of half the measured infiltration rate for design) and this is what I use across the board, useless stipulated otherwise.

Issues with the QLDC Spreadsheet

However, while QLDC has a very robust Code of Practice they also have a publicly available Excel spreadsheet that can be used for soak pit design sizing. This spreadsheet uses the NZBC E1 method and does not allow for climate change or clogging factors. It should be noted that their spreadsheet conforms to the NZBC E1, but not to their own Code of Practice, although the Code of Practice relates to land development, not necessarily individual buildings.

Side By Side Testing Method Comparison

If we look at a comparison between the two methods we can see the variation that arises when using the NZBC E1 method and why factoring in the dimensions of the hole is important.

To make a fair comparison between the two methods we need to look at the volume water loss per minute and have these the same for each method.

Take a 100mm diameter hole, 1500mm depth with the water level at 200mm below ground surface (starting level and held for constant head) in sandy silt.

Looking at the NZBC method, using a measured drop of 500mm in 5 minutes or 100mm/minute, results in a 785.4cm3 per minute volume water loss. The NZBC method provides a soakage rate of 6,000mm/hr for this site. The soakage rate is calculated by: 60 x drop (in mm/minute).

However, when compared to the constant head method, using the same 785.4cm3 per minute volume water loss rate, then a calculated Ksat of 23mm/hr is gained. This is approximately 260 times less than the soakage rate gained from the NZBC method. This is simply by factoring in the internal surface area of the hole through which the water can infiltrate the soil.

If the same soakage rate (785.4cm3 per minute volume water loss) was used in a hole of 500mm depth then the Ksat rate from the constant head would be 209mm/hr. When the hole diameter is doubled to 200mm for a 1500mm depth then the constant head value is 17mm/hr. Yet in these scenarios, the NZBC method still has the same rate. Therefore, this shows that the hole dimensions make a difference in the value and should be factored into the soak rate calculations.

If the soil is changed to something else, say clay and the same hole dimensions are used and the NZBC method has a drop of 12mm over five minutes, this is a drop of 2.4mm/minute which is 18.8cm3/minute thus returning a soakage rate of 144mm/hr. In this example, the Ksat rate using the constant head method would be 0.4mm/hr. Therefore, the value gained using the NZBC method is **360** times greater than from the constant head.

Conclusion

As can been seen using just these few examples the NZBC E1 method appears to be flawed as there are important dimension parameters not accounted for. Furthermore, the method for sizing does not allow for climate change or clogging over the projected life of the system.

Ideally, I would like to see NZBC E1 updated to provide a better and more robust testing method (such as the constant head method detailed in AS/NZS1547:2012 Appendix G), an allowance for both climate change and clogging factors, and using a higher AEP event (such as those used in the QLDC Code of Practice mentioned above).

In the meantime, I suggest following the QLDC Land Development and Subdivision Code of Practice (2020) combined with the testing method detailed in AS/NZS1547:2012 Appendix G (or a similar method that accounts for the dimensions of the hole) for more conservative and probably more realistic results.