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| Project Information | |  |
| Project Number - Title | 22013C - Steam Boiler Project | |
| Document Number | N/A | |
| Document Title | Steam Boiler Water Consumption | |

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1.0 Project Introduction & Objective(s)

This note summarises the total water consumed by the boiler project for input to the Environmental Permit. The water consumption reported is based on the following considerations:

- 4 boilers are installed
- Blowdown rate is 1% of steam production rate (which is comparable with current operation at site)
- The plant is operating in “Current Max” scenario with plant steam demand of 56,023 kg/hr

This report covers the water consumed by the boiler project only and does not include any consumption from the existing site.

It is important to note that this project is designed to replace the 3rd party boilers currently operating at the site which will be shutdown prior to starting the new boilers. It is generally expected that the new boilers will be more energy efficient and will likely be slightly more efficient in terms of water consumption.


2.0 Demineralised Water

The boiler project is supplied with demineralised water (DMW) which is generated by Solvay using ion exchange. The demineralised water has a very low dissolved solid content which enables the plant to operate with minimal blowdown rates. The DMW is combined with recovered condensate from the process heat exchangers. The process is designed to maximise condensate recovery as much as practical to minimise plant fresh water addition and operating costs. The total condensate recovery from the site is approximately 90% based on plant operating experience.

| | |
|--------------------------------|------------------------|
| DMW Consumption | 6430 kg/hr |
| Plant Operating Hours per year | 8430 hours per year |
| Plant Operating Factor | 95% ⁽¹⁾ |
| Annual DMW Consumption | 51,500 tonnes per year |

Notes:

1. When online the plant operates at an average of 95% of design capacity

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3.0 Well Water

Well Water is currently consumed on site for various process uses. The Steam Boiler Project will use some well water to cool the blowdown from the boilers. The blowdown rate is minimised by ensuring high quality DMW is used as make-up. Additionally, a blowdown flash vessel has been added to the scope to recover as much energy as possible from the continuous blowdown. This ensures that the consumption of well water is minimised.

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| Well Water Consumption | 2000 kg/hr |
| Plant Operating Hours per year | 8430 hours per year |
| Plant Operating Factor | 95% ⁽¹⁾ |
| Annual Well Water Consumption | 16,000 tonnes per year |
| Notes: | |
| 1. When online the plant operates at an average of 95% of design capacity | |

4.0 Towns Water

Towns water (from United Utilities) is currently consumed onsite for various uses. The Steam Boiler Project will consume a small amount of Towns Water to cool the sample coolers (online and manual sampling). The vendor of the chemical dosing package has confirmed that the online analysers will require approximately 0.2-0.3m³/hr of towns water for the cooling systems. It is assumed that the total Towns Water consumption will be approximately 0.5m³/hr for all users.

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|---|-----------------------|
| Towns Water Consumption | 500 kg/hr |
| Plant Operating Hours per year | 8430 hours per year |
| Plant Operating Factor | 95% ⁽¹⁾ |
| Annual Towns Water Consumption | 4,000 tonnes per year |
| Notes: | |
| 1. When online the plant operates at an average of 95% of design capacity | |