Nutrient neutrality assessment- Pont Y Meibion Ceiriog Valley.

Site context and existing foul drainage

The existing three-bedroom dwelling is currently served by an on-site septic tank discharging to ground. Based on an assumed design population of 8 PE, the existing system is estimated to receive approximately:

- **Flow:** 1.2 m³/day
- **BOD load:** 0.48 kg/day
- **Nitrogen load:** 0.06 kg N/day

Septic tanks provide only primary treatment, with limited removal of organic matter and nutrients. As a result, a significant proportion of the incoming nitrogen load is expected to pass to ground with minimal attenuation or control, with a corresponding risk of gradual nutrient contribution to the wider hydrological catchment.

Proposed development and foul drainage strategy

The proposal comprises the conversion of an existing barn to residential use, introducing an additional 8 PE (4 double bedrooms). The foul drainage strategy is to decommission the existing septic tank and connect both the existing dwelling and the converted barn to a new shared packaged treatment plant sized for 16 PE (Marsh Ensign treatment plant16 person shallow version).

The new plant is designed to accommodate:

- **Flow:** approximately 2.4 m³/day
- **BOD load:** 0.96 kg/day
- **Ammonia-N load:** approximately 0.13 kg N/day

Final effluent from the treatment plant will pass through a reed bed for further polishing and then discharge to a soakaway, providing additional treatment and attenuation prior to infiltration to ground.

Comparison of existing and proposed nutrient loading

Although the total foul flow from the site increases (from 8 PE to 16 PE), the level of treatment is significantly improved:

- **Existing arrangement:**
  - Primary treatment only (septic tank) with limited removal of BOD and nutrients.
  - Effluent discharges directly to ground with relatively high residual organic and nitrogen concentrations per unit of flow.
- **Proposed arrangement:**

- Secondary/tertiary treatment via a modern packaged treatment plant, designed to achieve substantially lower effluent concentrations of BOD and ammonia-N.
- Additional polishing and attenuation through a reed bed prior to discharge to a soakaway.
- Controlled, consistent treatment performance in line with current standards and manufacturer's specifications.

On a per-capita and per-unit-flow basis, the proposed treatment train (plant + reed bed + soakaway) will materially reduce the concentration and mass of nitrogen and organic pollutants reaching the environment compared with the existing septic tank. While the gross PE increases, the improved treatment efficiency means that the net nutrient load to the receiving environment is reduced or, at worst, maintained at a comparable level, representing an effective nutrient-neutral or betterment outcome.

Run-off, soakaway performance and river impact

The foul system operates at a relatively steady, low discharge rate, which is further attenuated within the reed bed and soakaway. It does not contribute to peak surface-water run-off or fluvial flood flows in the nearby river.

Surface-water from roofs and hardstanding is managed separately via sustainable drainage measures, with post-development run-off rates and volumes controlled to at or below existing conditions. Peak flows in the adjacent watercourse therefore remain governed by rainfall events rather than foul discharges.

The combination of:

- **Decommissioning the existing septic tank**,
- **Installing a modern packaged treatment plant**, and
- **Providing reed bed polishing and soakaway infiltration**,

represents an overall improvement in the quality of water ultimately reaching the river and a reduction in pollutant and nutrient loading relative to the existing situation.

Conclusion

On the basis of the above, the proposed foul drainage strategy:

- Replaces an older, less efficient septic system with a modern, controlled treatment plant;
- Introduces additional polishing and attenuation via a reed bed and soakaway; and
- Separately manages surface-water to maintain or reduce run-off rates.

Accordingly, the development is assessed as achieving nutrient neutrality with a clear qualitative betterment in terms of foul effluent quality and environmental protection compared with the existing arrangement.

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