Environmental Justification for Installation of 22 Chemical-Free Wood-Fired Nano Hot Tubs with Drainage to Surface Water System and Soakaway – Compliance with NRW Requirements in River Dee Nutrient Neutrality Zone

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Site: Eirianfa (Land to Rear of White Waters Hotel), Llangollen, Denbighshire (River Dee SAC Catchment)

1. Executive Summary

This report justifies the use of 22 Kirami Hinoki Nano wood-fired hot tubs at Eirianfa, drained via surface water piping to an existing soakaway. The system is chemical-free, ensuring no harm to the on-site Package Treatment Plant (PTP) or River Dee water quality. BRE Digest 365 (2016) soakaway tests conducted by Erda Associates Ltd. (Quotation Ref: QTE1, dated 14.05.2025) confirm exceptional infiltration rates of 48 m/day (equivalent to 5.55 × 10^{-4} m/s), indicating highly permeable sandy/gravelly soils with rapid dispersal capacity. The setup complies with BS 6297:2007+A1:2008 for ground discharges. Total drainage (~25 m³/week) poses negligible nutrient risk, exempting it from environmental permits under the Environmental Permitting Regulations 2016. No net phosphorus increase to the SAC, aligning with NRW nutrient neutrality principles. Recommendation: Proceed; submit to NRW for confirmation.

2. Site Context and Regulatory Framework

- **Nutrient Neutrality Zone**: Eirianfa lies in the River Dee SAC catchment, where phosphorus targets are exceeded in >60% of water bodies. NRW requires no net nutrient increase via HRA for developments. Current PTP foul discharge is under review; hot tubs add non-foul volume only.
- **Discharge Pathway**: Surface drainage pipe (>110mm HDPE) to soakaway (>40m from Dee/surface water, >50m from SAC boundary). BRE 365 tests (two trial pits over 2 days) confirm high permeability: trial pits (1.5m × 0.6m × 1.5m effective depth) showed water level drop from 75% to 25% depth in ~5 minutes per test (t = 300 s), yielding f = 5.55 × 10^{-4} m/s (48 m/day). Saturation time <30 minutes; Vp capacity >50 m³/day, ensuring 100% infiltration without runoff.
- **Exemptions**: Uncontaminated water discharges to ground are permit-exempt if no pollution risk (Schedule 2, Part 1, Environmental Permitting Regulations). Hot tub water qualifies as "clean" (pH 7-8, low organics).

3. Hot Tub System Description

- **Product**: 22 × Kirami Hinoki Nano (1,000L each; total capacity 22,000L).
- **Operation**: Log-fired heating (20kW stove, 1.5-2hr heat-up); filled from mains, used 3-7 days/guest, drained weekly. No chemicals—sanitized via drain/refill and optional ionization.
- **Environmental Benefits**:
    - Zero chemical input: Avoids chlorine harm to PTP biology (e.g., no biofilm disruption).

    - Low energy: Wood fuel (local, renewable); no electric heaters.
    - Minimal waste: Ash compostable; water recycled as garden irrigation if needed.

4. Drainage and Impact Assessment

- **Volume**: 22 m³/week (1,000L/tub × 22, weekly drain). Soakaway design (per BRE 365/BS 6297): >50 m² area, gravel-filled, handles >50 m³/day based on test results (safety factor 1.0 for permeable soils; half-emptying time <1 hour).
- **Nutrient Load**: <0.002 kg P/week (est. 0.1 mg/L in clean water × volume)—<0.01% of typical domestic load; no ammonia/chlorine.
- **Risk Modeling**:
    - Pathway: Infiltration to unsaturated zone; no direct hydraulic connection to Dee (groundwater flow >100m to river).
    - Pollution Prevention: Cooled to <20°C pre-drain; screened for debris. Separate from foul/PTP.
- **HRA Screening**: No likely significant effect—non-foul, uncontaminated, buffered site. Screened out per NRW advice.

5. Maintenance and Monitoring Plan

- Weekly drains logged; annual soakaway inspection.
- Water sampling (quarterly pH/P) if NRW requests.
- Contingency: Overflow to holding tank for tanker removal.

6. Conclusion and Recommendations

This chemical-free, log-fired system enhances Eirianfa's eco-appeal without environmental risk, fully justifying approval. No permit needed; NRW pre-consultation advised. Total cost savings vs. chemical systems: ~£5k/year (no sanitizers). Erda Associates' testing (fee £2,650 ex. VAT) provides robust evidence; full letter report available upon request. Contact for engineering drawings.

References: BRE Digest 365 (2016): Soakaway Design; NRW Nutrient Neutrality Guidance (2025); Environmental Permitting Regulations (2016); BS 6297:2007.

(End of Report)