Description Wessex Water is to supply the new development of 2000 houses in Poundbury with drinking water. It has been determined that a pumping station (PS) at Burton will supply water from the regional main to a service reservoir (SR) at Lambert’s Hill, which in turn will allow water to flow by gravity to the urban development. There are therefore two pipes that need to be designed, the pumped trunk main from Burton PS to Lambert’s Hill SR, and the gravity distribution main from Lambert’s Hill SR to Poundbury. You are tasked with examining the alternatives and proposing the most cost-effective solutions; your designs will encompass the route, pipe material, pipe diameter and, for the trunk main, the outline pump arrangement. You will also advise on the need for pressure surge protection. The pipeline’s route will be governed by a number of factors, amongst them system hydraulics (ground elevation and slope), land use (landowners, road / rail and river crossings), sensitive areas (AONB, CWS, SSSI, SAM) and access (construction and maintenance). The pipeline’s diameter will be governed by system hydraulics (pressure, flow, friction, length) and the material will be governed by ground conditions and costs. The pertinent requirements from the Wessex Water Design Standards are given below (for more information please refer to the full document on the module website): 1. General • Trunk mains shall not be used to provide local supplies 2. Design capacity • Trunk mains shall be sized for peak week or maximum day demand • Distribution mains shall be sized for peak hour demand on maximum day demand 3. Design velocities • Both minimum and maximum velocities shall be considered • The diameter / velocity shall be optimized for pumping mains by calculating 60 year whole life cost • Min velocity based on 12 hour retention time; max velocity < 2.0 m/s for trunk mains and < 1.5 m/s for distribution mains 4. Hydraulic design • Colebrook White (HR Wallingford look-up tables) • Roughness values to allow for future deterioration 5. Min pressure • 6m anywhere along pipe• Distribution mains must be >15m (design for 20m) 6. Max pressure • Where pressures in the distribution system are in excess of 35m consideration shall be given to the installation of PRVs (see section 18) • Max pressure limited to 16 Bar in pumped trunk mains [e-mail from Wessex Water] 7. Pipe pressure rating • To account for hydraulic testing, surge and fatigue 8. Material • DI or PE 9. Protection • Soil survey is required 10. Jointing • Assume costs cover industry standards (n/a) 11. Gradients • Thrust blocks are required for steep gradients (assume n/a. Crossings • Major crossings (at railway lines, rivers and main roads) will require twin pipes with isolating valves to be laid • Buried crossings preferred 13. Cover and clearance • Cover to crown of 0.9m to 1.3m • Minimum separation from other pipes / ducts / cables of 500mm 14. Swabbing chambers • Every 2.5km or less 15. Thrust blocks • Required on bends / branches where pipelines not continuous or pipe material does not possess adequate tensile strength 16. Valves • In-line valves every 2km or less • Air valves at high points 17. Hydrants and washouts • Washout valves at low points 18. PRVs • Shall be installed as required In evaluating the options, your report must: • Use outline design to size appropriate pipes of appropriate materials • Address the costs and relative benefits of each scheme • Make a recommendation as to which scheme should be taken forward to detailed design • Use performance curves to select pumps for Duty / Standby / Assist operation • Advise of the need for pressure surge protection