

## 2 Description of the Proposal

### 2.1

#### 2.1.1

#### *The Existing Situation*

##### *Existing Mopley Booster Pumping Station (Hampshire)*

##### (a) Pipeline Arrangement

The 450mm diameter ductile iron main from Testwood Water Supply Works (WSW) is located to the west of Mopley Booster Pumping Station. A 300mm diameter pump suction pipe tees off from the Testwood main and supplies five pumps in parallel. The pumps discharge into a 450mm delivery pipe which reconnects to the Testwood main.

Gate valves are located on the Testwood main and the suction/delivery pipes so that the pumping station can be bypassed. Gate valves have also been installed upstream and downstream of the individual pumps to enable isolation. A non-return valve is installed on the vertical section of the delivery pipework for each pump.

##### (b) Pumping Station

The booster station at Mopley currently comprises the following equipment: -

- 5 above ground split axial booster pumps

The pumps are located above ground and the casing and pipework have been lagged apart from Pump No 4 which is housed within a kiosk.

The pumps can be operated singularly or in various combinations to provide flows up to approximately 12 Ml/d.

There are hard-wired interlocks to protect the pumps against low suction pressure and high discharge pressure on site.

- 2 Glass Reinforced Plastic (GRP) kiosks
- 1 mobile phone telephone station
- 1 HV substation
- 1 above ground valve chamber

### 2.1.2

#### *Existing Pipelines*

Downstream of Mopley, the transfer pumping system comprises both overland and marine pipelines. The existing overland transfer mains primarily involve approximately 5.4km of single 450mm diameter ductile iron pipelines terminating close to the shore at Lepe and at Gurnard. These pipelines are in a satisfactory condition and have sufficient capacity for the anticipated future growth.

The existing Solent crossing pipelines consist of two 200mm flexible steel armoured plastic pipelines across the Solent between Lepe and Gurnard, comprising the Cross-Solent mains. The 3.6km long pipelines were installed in 1980 (following the 1976 drought, to ensure that customer supplies were secured for future years) and had an anticipated life of 25 years. The pipelines were laid in parallel directly on the seabed from a barge, with only the intertidal sections buried using conventional open cut techniques.

The existing pipes at Broadfields comprise generally over-ground pipes within an existing building with a small section of pipes underground.

## 2.2

### ***Description of the scheme***

### 2.2.1

#### *General*

The proposed scheme (Figures 2.1 to 2.3) involves the replacement of the water mains between Lepe in Hampshire and Gurnard on the Isle of Wight, as well as installation of new pumping equipment at Mopley Booster station (Hampshire), and the replacement of pipes at Broadfields (Isle of Wight). It also includes additional works/modifications to link to the existing infrastructure ensuring compatibility between the new and existing operations.

The objectives of the scheme are to provide a more secure supply to the Isle of Wight and to upgrade the transfer capability up to 20Ml/d.

The scheme will be located partly within areas administered by New Forest District Council, Hampshire County Council and the Isle of Wight Council. The remaining central section of the scheme will lie within an area of seabed owned by the Crown Estate.

The following sections describe the proposed activities associated with the scheme.

### 2.2.2

#### *Modifications to Mopley Booster Pumping Station*

At Mopley, the proposed scheme, which lies within the New Forest (approximately 4km north of Lepe Country Park), will involve: -

- a new connection to the existing 450mm pipeline;
- replacement/modification of the suction pipelines and delivery pipework;
- installation of 3 new pumps (including associated cabling and controls);
- provision of additional GRP Kiosk; and
- removal of all existing pumps and associated redundant control plant.

The proposed modifications at the station (Plate 1) to make the pumps compatible with the existing main, will be designed to cater for an increase in peak demand up to 20Ml/d over a 21 hour period (to ensure compatibility of the pumps with the proposed main and to take advantage of favourable electricity tariffs). It is considered unlikely that any of the existing units can be cost effectively adapted for the new main duty and that all should be replaced. The modifications, which will all be contained within the existing operational compound at Mopley, will involve the replacement of three existing pumps with two variable speed replacement units and one fixed unit, and also upsizing the 300mm diameter pump suction pipe to 450mm diameter.

#### **Plate 1** *Mopley Booster Station - Existing*



It is proposed that a new kiosk (approximately 10m x 3m x 2.5m high and similar to the existing) housing switchgear and pump controls will be constructed in the

south-western corner of the existing compound (an area of 760m<sup>2</sup>) on concrete pad footing at Mopley.

The existing kiosk at Mopley housing pump 4 will be removed and transported to a suitable waste processing facility and the existing kiosk situated on the northern side of the compound adjacent to the transformer will be removed once the new pumps and system is in full commission. The existing transformer will remain as will the existing telemetry kiosk closest to the gate towards the north-eastern corner of the compound.

### 2.2.3

#### *Modifications to Pipelines at Broadfields Reservoir*

It is proposed that the pipework at Broadfields (Plate 2) will be replaced and will involve the upsizing of pipes and the installation of new valves and pipe fittings within an existing operational site. A 250mm diameter underground pipe will be replaced with a 450mm diameter pipe outside of the building between the sliding entrance door and a manhole (left)

#### **Plate 2** *Broadfields - Existing*



The proposed works at Broadfields have been considered but will not result in any significant environmental effects and therefore have not been assessed within the ES.

#### 2.2.4

##### *Replacement of the existing potable water supply mains (Lepe to Gurnard)*

##### Pipe Installation

Twin pipelines will be installed between Lepe in Hampshire and Gurnard on the Isle of Wight. The pipelines will be routed near to the shortest crossing point between the mainland and the Isle of Wight.

The pipelines will be installed as follows: -

- (a) Installation of underground pipes within the foreshore/inshore sections by horizontal directional drilling (HDD) from land to below the low water mark (beyond Gurnard Ledge on the Isle of Wight side and beyond the internationally designated conservation sites on both sides of the Solent).

At Gurnard, this will involve the installation of two pipes within PE sleeves approximately 500mm internal diameter and 900m long. The exit points of the drill will be at a distance of between 600 and 650m offshore at -22mOD at the bottom of the Gurnard Ledge; the two parallel drills starting approximately 10 – 15m apart and finishing approximately 60 – 80m apart. The pipework laid in trenches adjacent to the flowmeter chamber will be ductile iron (DI).

At Lepe, the proposal will involve the installation of two PE product pipes approximately 300mm internal diameter and 1100m long. The exit points will be approximately 670m offshore at -14mOD; the two drills starting approximately 10 – 15m apart and finishing approximately 60 – 80m apart.

Care will be taken to avoid existing permanent structures and services.

- (b) The central section of the twin pipelines will be armoured flexible pipes 300mm internal diameter laid on the seabed for the approximate 2200m long mid section and subsequently buried by an embedding technique involving pressure jetting with sea water. The embedment system will involve a frame that straddles the pipe and displaces the sand and gravel material from beneath the pipe, driving it along the line of the pipeline and thereby burying it to a depth of approximately 1.2m below the seabed. This proposal will provide additional security and protection against currents, propeller wash and anchor damage.

Light armouring by rock or proprietary concrete mattresses over the twin pipeline on the seabed will be undertaken in a few localised places, as follows: -

- around the HDD exit/pipeline connection points;
- where the pipeline passes close to the East Lepe Buoy (this has a 5 tonne metal sinker, which is occasionally lifted for maintenance); and
- where due to particular local seabed conditions, it is not possible to embed the pipeline to below the seabed level (this is considered unlikely as geophysical surveys and ground investigations indicate that there is over 1m depth of superficial deposits throughout the marine route of the pipelines).

Within the central marine section, the route of the pipeline will involve a westerly curve, primarily to fit within the existing services (Figure 1.1) and navigational aids. The twin pipeline will be laid without interfering with the surrounding existing services.

- (c) Connections between the marine and HDD pipeline sections will be undertaken either by divers working on the seabed or by raising the ends onboard a vessel.
- (d) Installation of a single 450mm PE pipeline at Gurnard between the existing water supply connection chamber in a field to the north of Cliff Farm (on Rew Street), and the drill rig site in the field to the south of Cliff Farm. This will involve PE pipe installed by HDD technique for a length of approximately 130m plus short connection sections of PE or ductile iron pipe by conventional open trench excavation. The drill rig site will be established in the southern field and the PE pipe will be pulled through from the northern field from where it will need to be strung. The stringing will require approximately 130m and will be done within the northern field.

The guaranteed life expectancy of the proposed marine armoured flexible pipeline is limited by the manufacturer to 25 years although in practice it should last much longer provided the external plastic sheath is undamaged.

### Horizontal Directional Drilling Rig Sites

The works will comprise the setting up of two drilling rig sites comprising site construction offices and associated welfare facilities, mud handling plant, temporary mud pits and water storage lagoons on land (at drill entry sites) with temporary working areas (approximately 6000m<sup>2</sup> at Lepe, 4700m<sup>2</sup> at the northern site at Gurnard and 3900m<sup>2</sup> at the southern site at Gurnard) on each shore. Polyethylene (PE) is considered to be the most appropriate pipe material.

The scheme will require the setting up of a large rig at the following drill sites: -

- Lepe, Hampshire (Plate 3) – in part of an arable field (which was until recently used for pig keeping and is currently used for potato growing) at a ground elevation of approximately 7mAOD just to the north of Lepe Country Park and approximately 220m from the shoreline.

**Plate 3**      *Proposed Rig Site at Lepe*



- West Gurnard, Isle of Wight (Plate 4) – in part of a grassy field approximately 240m landward from the shoreline, to the west of Rew Street and south of Cliff Farm at a ground elevation of 10mAOD. A working area of 3900m<sup>2</sup> will be required. The proposed rig site lies approximately 150m south of the existing valve chamber.

**Plate 4**

*Proposed Rig Site at West Gurnard*



A large quantity of water will be required during drilling operations. A water supply will be taken from the existing main and stored within a 300m<sup>3</sup> bund. Although recycling of water will occur, some losses will need to be made up throughout the drilling operations. No external power supplies will be required, however mobile generators will be positioned within the site.

A compound at both Lepe and Gurnard will be set up at the drill rig sites and will require the construction of a strong and durable temporary working surface for the heavy plant, lifting operations and storage of equipment. Both drill rig sites will be stripped of the topsoil and a temporary bund formed. The topsoil will be stockpiled so that the field can be reinstated at the end of the operation. Geotextile sheeting will subsequently be laid on the ground and covered by stone/hardcore to an average depth of approximately 30cm. The stone and geotextile will be removed on completion of the scheme and the topsoil replaced.

#### Flow Meter Chambers

Flow meter chambers will be constructed at both Lepe and Gurnard.

At West Gurnard, it is proposed to connect the new Cross-Solent pipeline to the existing 450mm diameter pipe at a point adjacent to the existing valve chamber. This will be undertaken by providing a tee piece in the existing pipe with each leg valved. The valves will be buried with access covers. This will be in the field which

lies to the west of Rew Street and to the north of Cliff Farm. The flowmeter chamber will be located in the southern field at West Gurnard (drill rig site). An access route will be required in this field. The chamber will be of approximate size 7 x 4 x 3m depth overall will be erected within the drill site compound.

At Lepe, a flow meter chamber of approximate size 7 x 4 x 3m depth overall will be located on the road verge to the west of the drill site on Lepe Road.

The top and walls of the existing chamber in the lower car park at Lepe Country Park will be demolished to 500mm below the ground level and subsequently backfilled with suitable granular material to provide a finished surface similar to the surface of the car park.

#### Other Infrastructure

Permanent control kiosks (approximately 1.10m high, 1m long and 0.45m wide) to house telecommunications and electricity will be erected on a small concrete pad base located adjacent to the flowmeter chambers at both Gurnard (southern drill site field only) and Lepe. Details of these kiosks are currently under consideration.

The flow meter chambers at Lepe and on the southern field at Gurnard will require the laying of electricity and telecommunication cables to the nearest suitable point in the network. Initial investigations suggest that on Gurnard and Lepe this will not be greater than 200m. This may be done through either a duct, excavation or overhead cabling depending on their environmental impacts and the services suppliers' preference. This depends on the details of the existing electric and telecommunication infrastructure.

At both sites, the temporary water supply for use in the drilling will comprise a 63mm diameter PE pipe running mainly overland from the existing 450mm ductile iron water supply trunk main to the temporary 300m<sup>3</sup> water storage lagoon at the HDD working compound.

#### Access Requirements

Access into the drill rig site at Gurnard for a large drill rig and a mobile crane will involve the removal of the existing 4m wide field gate on Rew Street and the widening of the entrance to 8m. This will involve the loss of approximately 4m of hedgerow. A temporary route will also be required in the northern field for access to the connection chambers (Figure 1.1).

Access into the drill rig site at Lepe will require the removal of an 8m stretch of hedgerow. There is also a requirement to construct a temporary 8m long x 6m wide route to provide access to the drill rig working site. Part of the access may be retained on a permanent basis to provide a hard standing parking/working area in the roadside verge for future maintenance works at the flowmeter chamber

#### Existing Pipeline

The existing water mains will remain in situ in order to avoid adverse environmental, economic and social impacts.

In particular, the removal of the existing pipeline would result in major disturbance to land uses along its route including adverse impacts on the internationally designated conservation sites, intertidal habitats, woodland and agricultural land. The removal of the pipeline would also adversely impact on maritime users, recreational users (especially those within the Country Park) and would have detrimental impacts on landscape character, particularly within the New Forest National Park.

There would also be major time and cost implications associated with the removal of the pipeline by road or sea.

### 2.2.5

#### *Construction Methodology*

##### Vehicle and Marine Movements and Site Set-up

Vehicle and marine movements associated with the proposed scheme are discussed in section 16 "Traffic and Transport".

##### Temporary Fencing

Temporary security fencing will be provided at both drill rig sites and construction sites for security purposes.

##### Drilling and Stringing Operations

Works at the drill rig sites will be undertaken over a 12hour working period (between 7am and 7pm) for seven days a week. Once drilled, the installation of each pipe or sleeve will involve a continuous operation.

At both sites, drilling operations will take approximately 10 weeks at both sites.

At Lepe, the PE pipelines will be delivered and floated into position with the aid of tugs. One end of the pipelines will be attached by divers to the drill string where it emerges from the seabed and then pulled to land by the drill rig.

In contrast, the armoured flexible pipelines will arrive on a spool barge and will be pulled through to land at Gurnard via the PE sleeve and with the aid of a winch at Gurnard. The remaining pipeline will be laid on the seabed and embedded by jetting.

As part of the drilling operations, a small volume of drilling lubricant such as bentonite will be released on drill break out (a total estimated quantity of approximately 10 tonnes released in four separate parts of about 2.5 tonnes at each HDD exit hole). The duration of each release will be short, potentially over a couple of hours. These four short releases will take place within an approximate three month period.

#### Commissioning

As part of commissioning the twin pipeline will need to be cleaned to ensure that the water reaches the Isle of Wight un-polluted. This will be undertaken by flushing the pipes with a swab (sponge like equipment) from Lepe Country Park to the flow meter chamber in the southern field at Gurnard, thereby cleaning the pipes from the inside. The cleaning process will then involve the pipelines being filled with normal water, pressure tested and flushed through with highly chlorinated water, flushed through with normal water, tested for water quality and put into use. This chlorination and de-chlorination process is anticipated to take a minimum of one week for each pipeline.

Following obtaining the necessary consents, the water used for cleaning the pipes will be pre-treated to a standard at which it will be able to be discharged into a local watercourse such as a tributary to Gurnard Luck located to the south-east of Cliff Farm's boundary. It is proposed to lay a couple of hoses from a mobile water treatment unit adjacent to the flowmeter chamber alongside Rew Street for a period of approximately 2 days.

The water used for cleaning the pipes will be treated to a standard at which it will be able to be discharged into a local watercourse in accordance with Environment Agency requirements.

### Timings

The proposed works will be phased (due to the terrestrial and marine components of the scheme) as follows: -

- Site preparation works - February to May 2006
- Directional drilling – May to September 2006
- Marine Lay – October to December 2006
- Completion of the scheme in March 2007

#### 2.2.6

#### *Maintenance Works*

At Mopley Booster Station, the maintenance works will involve a weekly inspection of the pumps as is currently undertaken and some items of equipment such as motors will require replacement on an infrequent basis.

Occasional visits will be made to the flow meter chambers at Lepe and Gurnard to inspect and maintain the valves and flow meters, pressure monitoring, and routine maintenance and testing of the associated telemetry.