Tir y berth Depot – Biodisc Investigation

Report on existing Package Treatment Plant (PTP)

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EXECUTIVE SUMMARY

E1. Problem synopsis

E1.1 Tir y Berth depot is a CCBC operational and maintenance base located south of Bargoed with approximately 150 staff. When the depot was first commissioned in 1980, the number of staff was approximately 40.

The depot accommodates the following activities:

- Building Maintenance
- Fleet Management (including Commercial Vehicle Wash)
- Parks Services and Bereavements
- Building Cleaning
- Waste Management
- Sports and Leisure
- Facilities management
- CCTV

E1.2 The foul flow from the entire depot drains to a Biodisc installation located to the east of the depot immediately adjacent to the River Rhymney.

<u>The problem.</u>

- Waste passing through the Biodisc which is nearly 40 years old with no alternative.
- Amount of waste has increased since its commission
- Risks – if the unit fails severe pollution to the River Rhymney will occur and render the depot unserviceable.

There are a number of options to consider and are :

- Refurbishment of the existing unit (Option 1)
- Provision of a complete new unit (Option 2)
- Connection to the Trunk Sewer (gravity flow) (Option 3)
- Connection to the nearest mains drainage via rising main (Option 4)

The conclusion is that having considered the risks and within the current economic climate that Option 1 provides the most cost effective solution and it is therefore recommended that the existing unit is refurbished.

E2. Recommendation

E2.1 *It is recommended given the assessed risks and at this time, that the Client proceeds with Option 1 and seeks a number of quotes from suitable contractors to undertake the refurbishment of the existing unit.*

1. Introduction

1.1 Engineering Projects Group was commissioned on 6 October 2016 by Property Services to undertake an assessment of an existing Biodisc installation (PTP) that treats all the foul drainage from Tir y Berth Depot.

1.2 Tir y Berth depot is a CCBC operational and maintenance base located south of Bargoed with approximately 150 staff. When the depot was first commissioned in 1980, the number of staff was approximately 40.

The depot accommodates the following activities:

- Building Maintenance
- Fleet Management (including Commercial Vehicle Wash)
- Parks Services and Bereavements
- Building Cleaning
- Waste Management
- Sports and Leisure
- Facilities management
- CCTV

1.3 The foul flow from the entire depot drains to a Biodisc installation located to the east of the depot and immediately adjacent to the River Rhymney. As well as the foul flow, a commercial vehicle wash did discharge waste via a rising main to a foul drain at the north of the depot which eventually drained to the Biodisc. It is understood that this ceased in 2011 when this flow was diverted to a public foul sewer. Fleet Management have advised that when the wash was installed in 2010, the regime consisted of high pressure jet hosing and underbody cleansing. It is understood that the latter activity has now ceased and the wash is purely a cosmetic cleansing exercise.

1.4 The existing PTP installation has been identified as a Klargester unit installed in 1980 via a commission from the then Drainage Section of Rhymney Valley Urban District Council.

1.5 The unit was installed as there was no capability to drain, via gravity, to a suitable public sewerage system. No part of Dwr Cymru Welsh Water's (DCWW) system exists in the area, other than the Trunk Sewer which is located on the opposite side of the River Rhymney.

1.6 Since 1980 the depot has expanded considerably – it is thought that the number of staff at the time the depot opened did not exceed 40.

2. Site Reconnaissance and Survey

2.1 The unit consists of a system of rotating blades that continually agitate the foul element from the depot via aerobic biological action. As well as the foul flow, a commercial vehicle wash discharges waste via a rising main to a foul drain at the north of the depot which eventually drains to the Biodisc. The resulting liquid passes to the adjacent River Rhymney via an outfall structure. This flow, which is constantly monitored by National Resources Wales (NRW), has always been of water quality levels which are acceptable under DCWW standards.(Refer to Appendix 5 – recent samplings).

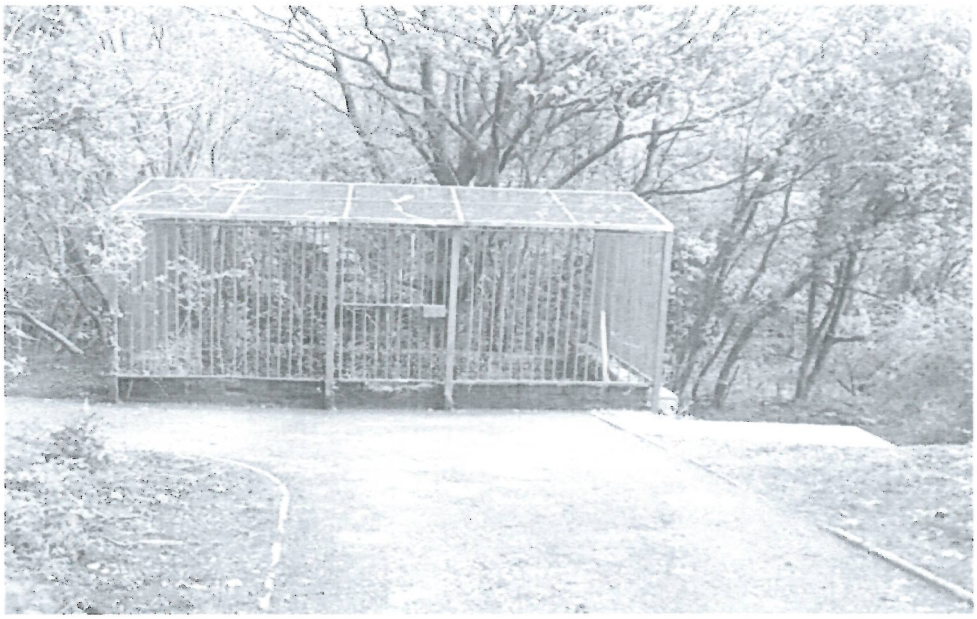

Plate 1 – security cage above the existing unit

2.2 The attached Drawing No. 001 (Appendix 6), shows the layout of both foul and surface water systems within the depot. The installation of the unit in 1980 was influenced by the lack of a formal DCWW foul system in the area. The nearest system is DCWW's Trunk Sewer which is located on the eastern side of the River Rhymney.

2.3 Maintenance of the unit is currently undertaken by a local environmental contractor – Egan Waste (Pontypridd). Tel. 01443 841833. The maintenance involves removal of accumulated sludge and the periodic mechanical/electrical assessment of the unit.

2.4 A three phase electricity supply provides power to the unit.

3. Site Meetings

3.1 Kingspan Environmental Ltd. (KEL) supply current Klargester units and were invited to visit site in order to assess the existing unit. It has been confirmed by Kingspan that the unit is an early Klargester unit (See Appendix 1 Kingspan 1st report). Two site meetings were undertaken by an engineer (Jeff White) on 5 and 16 December 2016 to assess the mechanical condition of the unit. An assessment of the electrical cabinet/circuitry was undertaken by the same engineer on 21 Feb 2017. Neil Wilstead (Engineering Projects Group) was present at all meetings. A visit by the company's Area Sales Manager (Stephen Rees) was carried out on 13 January 2017. The three reports on the engineer's visits are included in Appendix 1.

3.2 As part of the new maintenance regime, Egan Waste attended their first visit to the unit for sludge emptying and mechanical assessment on 7 March 2017. Neil Wilstead met with Daniel Egan of Egan Waste on site. The tank was successfully emptied and a brief assessment of the motor, bearings and ancillaries was carried out. The bearings at the gearbox were found to be worn as were the main bearings on the impeller shaft. The drive chain had stretched but had no detrimental impact on the overall performance.

4. General Condition Assessment of the Existing Unit

4.1 There are no documented reports on the historical maintenance of the unit, other than that which is included in Appendix 2 – Environmental Management System – Tir y Berth Depot. Within the schedule, the contractors undertaking the maintenance were Kee Services (first action 26 January 2015) and Mayglothing Waste Services Ltd. (first action 20 March 2015). It is understood that both of these contractors have now been replaced by Egan Waste Ltd. which will undertake both mechanical maintenance and de-sludging.

4.2 The existing unit is contained within a brickwork structure measuring approximately 5 metres by 3.5 metres. The brickwork is approximately 1.6 metres in height. Within this structure, the actual mechanisms are protected from the elements by a fibreglass shroud of two halves. A steel security cage (as shown in Plate 1) and two locked access doors prevent any unauthorised entry to the unit. The unit is not fitted with any alarm or telemetry. The internal volume of the brickwork structure is approximately 20 cubic metres ie. in the event of a power failure the structure would attenuate 20,000 litres of flow before pollution occurs.

4.3 The reports received from KEL indicate wear in the main bearings of the unit and possible degradation of the main shaft. A test on the circuitry, undertaken on 21 Feb 2017, revealed that the motor within the unit was in good working condition. KEL has been requested to provide costs for the refurbishment of the unit. The unit has remained serviceable for almost 40 years with little or no documented maintenance. However, it was not designed for the current numbers occupying the site and may be operating above its intended capacity.

4.4 The current requirement for a new unit to replace the existing Biodisc would require it to have sufficient volume to attenuate 6 hours of design flow should a power failure occur as stipulated in Part H2 of the current Building Regulations. (Refer to Appendix 11 for estimations of attenuation within the current structure.

5. Options for Maintaining Current Standard of Waste Disposal (i.e. foul flow)

5.1 Option 1 - Refurbishment of existing system and incorporation of telemetry – alarm system.

5.2 Option 2 - Provision of complete new installation.

5.3 Option 3 - Provide a formal connection to mains drainage – connection to Trunk Sewer.

5.4 Option 4 - Provision of pumps (1 active and 1 backup) in a new pumping chamber and rising main to a CCBC private sewer.

6. Options

6.1 Option 1 – Refurbishment of existing system and incorporation of telemetry.

6.2 Egan Waste undertook their first scheduled maintenance of the unit on 7 March 2017. EPG met on site in the presence of Daniel Egan. The unit consists of a metal cage supported by a 1 metre high continuous brick work wall only broken by an access door. This has the ability to attenuate any flow should a malfunction occur. However, once the top of the brickwork is breached, pollution spills directly to the river. The unit's sump was emptied and details were taken of the dimensions of the existing motor, gearbox and running gear. Danial Egan advised that due to the age of the unit the possibility of obtaining spares held by specialist stockists was remote. The likelihood was that all required parts would be bespoke rather than "off the shelf". Egan Waste was tasked to provide a lump sum cost for undertaking these repairs to include for parts and labour. To satisfy Health and Safety requirements, the enclosing metal cage around the existing unit would be removed and replaced after the repairs. The cost of engaging lifting equipment to undertake this element of the works would be included in the lump sum. Egan Waste have consistently been requested via e-mail to provide a written quote, but to date nothing has been received other than a verbal statement from Danny Egan that the total cost of the lump sum would not exceed £5,000 which includes all parts, labour and temporary works.

Summary
Lump sum (verbal quote only) £5,000

6.3 Option 2 - Provision of a new unit.

6.4 KEL have visited site and provided a quote for a new unit that is specifically designed for the current population of the depot. The model, Biodisc BG 600mm invert, has been quoted as £16,734 to include the necessary alarms and carriage to site. Not included is offloading at site, installation and VAT. It is uncertain of the operation of the current vehicle wash and indeed where it drains to. If it currently drains to the existing unit, KEL have indicated that it will have a detrimental biological effect on a new unit. The installation of a new unit will require the existing steel framework/roof above the brickwork plinth to be removed and replaced. Heavy lifting equipment will be required to remove the steel frame, off load and install the new unit and consequently replace the framework. It is anticipated to be undertaken over 3 days at a daily rate of £1,000 per day. This cost is based on current Network Contracting Services labour rates and mobile lifting equipment.

Summary

New unit	£16,734
Lifting equipment for removing frame/installing	£3,000
Add 10% contingencies	£2,000
Total	£21,734

6.5 Option 3 – Formal connection to Trunk Sewer

6.6 Tir y Berth Depot lies immediately west of the River Rhymney in Fleur-de-Lis. DCWW's Trunk Sewer is located on the eastern side of the river and any gravity connection to this would require crossing the river – either within the river bed or by crossing above water. An e-mail, dated 23 February 2017 (Appendix 8), was received from DCWW Developer Services after initial enquiries were made regarding connection to the Trunk Sewer. DCWW have declined giving approval for a gravity connection on the grounds that the extra flow may have a detrimental effect on the Combined Sewerage Overflows (CSO's) that are located on the Fleur-de-Lis side of the river.

6.7 Option 4 – Rising main and pumping chamber

6.8 In 1997, the then Welsh Water Group of CCBC was commissioned to undertake a report on draining the waste from a proposed commercial vehicle wash located in the centre of the depot (Appendix 3). Advice received from environmental colleagues at the time, indicated that the detergent from the wash would have a detrimental effect on the Biodisc if this waste was allowed to drain to it. The installation of the vehicle wash was not undertaken at the time, however it was eventually installed in 2010 following a subsequent feasibility report (Appendix 4), which highlighted the option of a pumping chamber and rising main to pump the waste to a private foul sewer chamber located in the grass verge at Horner Street, Tir y Berth. The report included a Bill of Quantities that was offered to Network Contracting Services (NCS) for pricing as a quotation. The route for the rising main was predominantly through hard surfaced areas and approximately 225 metres in length with a static head lift of 25 metres. In 2010, NCS returned a priced quotation of £75,000 for these works. The option of a pumping chamber and rising main to accept both foul flow and waste from the vehicle wash has been identified due to the advice from KEL (e-mail dated 21 February 2017 – Appendix 9).

The e-mail states that should Option 2 be progressed ie. a new complete unit from KEL, they could not offer any warranty on the plant or performance of it, unless the vehicle waste was taken elsewhere ie. Option 4.

Summary

230 metres of rising main in concrete, tarmacadam and grass verge	£101,000
2 no. submersible pumps 225 metres of 50mm pipework and a Static head lift of 15 metres 2@ £1,250 each	£ 2,500
Add 10% contingencies	£10,350
Total	£113,850

7.0 Conclusions, including the risks associated with each option

7.1 Option 1 is by far the most cost effective solution. Whilst the existing unit is approximately 37 years old, little if any repairs have been undertaken, other than emptying of the sump. KEL have stated that, when commissioned the maximum number of individuals the unit was capable of dealing with, while successfully meeting the flow to rivers standards for that time, was 40. Recent monitoring of the unit's outflow at the river indicate that it is well within that set by Dwr Cymru Welsh Water – DCWW (see Appendix 5). It is proposed to incorporate telemetry within this option, which will immediately warn of any malfunction of the unit.

The risks associated with this option are centred on the existing structure having the ability to attenuate flow from the depot once a malfunction has been identified. Whilst pollution to the river is prevented until flow breaches the top of the brickwork plinth, the effect on the depot means that the use of all toilet, washing and kitchen facilities would be temporarily terminated.

7.2 Option 2 includes for a new unit that will cater for the current populous of 150. However, KEL have indicated that the detergent from the vehicle wash will have a detrimental effect on the operation of the new plant. (see Appendix 9).

It is uncertain if the vehicle wash is being used to its full capacity ie. body and under chassis cleansing. Indications from Fleet Management, point to the wash being used fairly infrequently as a purely cosmetic cleanse.

7.3 Option 3 includes for a direct connection to DCWW's Trunk Sewer on the opposite side of the River Rhymney in Fleur-de-Lis. However, an e-mail dated 23 February 2017 was received from DCWW declining this direct connection on the basis of no spare capacity in the Trunk Sewer. Therefore, this is not a viable option.

7.4 Option 4 is the most expensive and the most disruptive to the current operation of the Depot. It includes for a pumping chamber and rising main approximately 230 metres in length. Current estimate for the works is £113,850.

8.0 Recommendation

8.1 Considering the above circumstances, Option 3 is not feasible and Option 4 is the least cost effective. The suppliers of a new unit, as Option 2, cannot guarantee the effectiveness of it due to the use of the detergent.

Option 1 is the most cost effective with the existing unit as it is, providing satisfactory outfall samples. Refurbishment will prolong what is currently an acceptable situation.

It is therefore recommended that Option 1 be adopted with the unit refurbished by Egan Waste Ltd. The inclusion of telemetry will also be included.