



ODOUR MANAGEMENT PLAN (OMP) FOR THE OPERATION AND MAINTENANCE OF QUEENSFERRY WASTEWATER TREATMENT WORKS

Agreed By:

	Name	Date
DCWW Project Manager:	Richard Whittaker	31/10/2020
Operator Area Representative	Nigel Lee	31/10/2020
Odour Workstream Manager:	Mike Loyns	31/10/2020

REV 4/ 31ST OCTOBER 2020

1.0 PURPOSE

The purpose of the Odour Management Plan (OMP) is to ensure that any odours arising from the site are properly managed so that the risk to the local amenity is minimised as far as practicable. This will be achieved by compliance with the OMP and regular monitoring and review of its operation.

2.0 EMERGENCY CONTACTS & PROCEDURES

When possible, all odour complaints shall be directed to the DCWW Sewerage Call Centre (**08000 853968**). Complaints shall also be recorded at site and directed to the call centre for recording purposes.

POSITION:	Name	CONTACT TEL NUMBER	RESPONSIBILITY:
Operator	Operations Team		To carry out checks
Area Controller	Area Supervisor		To investigate odour complaints, advise action and liase with complainant
Catchment Manager	Nigel Lee		To co-ordinate improvements if required
Flintshire County Council:	Environmental Health Department	01352 703440	Inform of generating activities by area controller

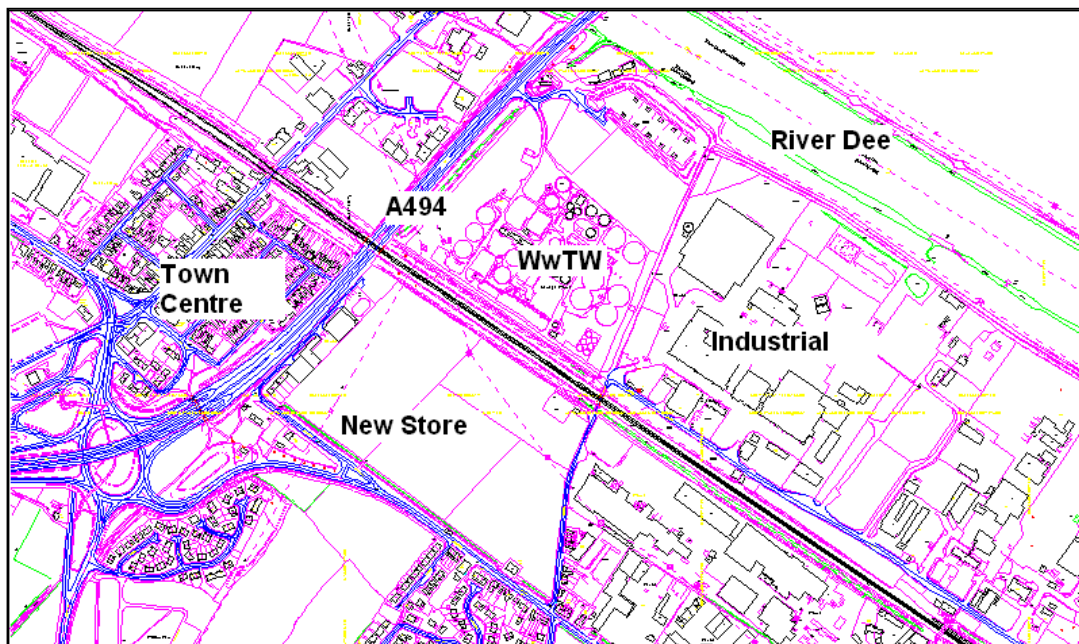
2.1 Site Location.



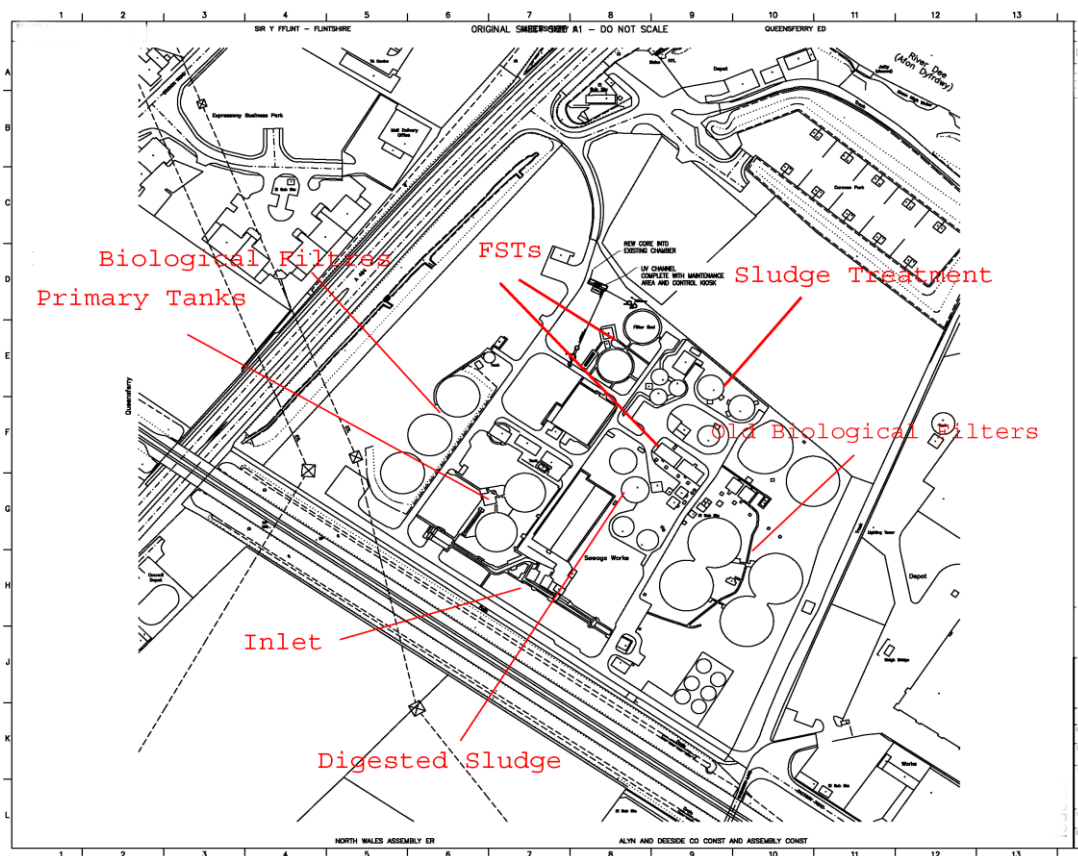
Queensferry WwTW

Queensferry is a medium sized WwTW approximately 6 miles west of Chester and immediately east of the A494. The North Wales coastal railway runs immediately to the south of the works (a Macro superstore is located immediately beyond the railway). Treated effluent is discharged to the River Dee 100m north of the site.

The current population equivalent served by the site is estimated at 50,000 (resident population of approximately 35,000 with a trade contribution of around 15,000).



3.0 SEWAGE TREATMENT PROCESS DESCRIPTION



3.1 Catchment:

Queensferry WwTW (Landranger grid SJ322682) is located in North Wales close to the junction of the A494 (T) and B5129 (Chester Road East). There are properties or industry to the North, East, South and West of the site. The A494(T) trunk road, a major route for traffic entering and leaving North Wales, runs along the site north western boundary with the River Dee to the north. The downwind area of the site is to the east/northwest, given a prevailing west/south westerly wind includes a travelers caravan site but is predominately either farmland or industrial areas. Given seasonal easterly or southerly winds residential areas and an ASDA Supermarket can on occasion be downwind of the site.

All flows are pumped to the sites via five separate rising mains, including flows from the Deeside Industrial Park to the West. No significant septicity study has been carried out with respect to the works catchment. There are currently no catchment septicity control measures.

There are five principal routes by which flows arrive at the site (there are yes/no gravity flows direct to the site):

- Pumped flows from Deeside Ind. Park PS
- Pumped flows from Garden City PS
- Pumped flows from Factory Road PS
- Pumped flows from Chester Road PS
- Pumped flows from Pentre PS

3.2 Inlet & Preliminary Treatment:

Flows to the works are discharged from various rising mains into an inlet works at the south eastern corner of the site. The inlet works is provided with structural OCS GRP covers as far downstream as the inlet screens. Crude sewage then passes into open detritors and channels, flows gravitate to pumps that discharge into a raised structure. Flows gravitate from this point to primary treatment.

Flows from the five influent rising mains discharge into separate covered inlet chambers and then flow down a covered inlet channel. Preliminary treatment takes place within elevator screens and a detritor. Whilst the screens are equipped with a screenings compactor and skips, grit has to be periodically manually removed using vacuum tankers from the detritor at the downstream end of the detritor.

Primary Treatment

Flow to full treatment then passes to two circular primary settlement tanks.

3.2.1 General Odour Considerations for Inlet & Preliminary Treatment

- Limit the occurrence of septic flows through the inlet works by monitoring incoming flow (pumped/gravity), tanker domestic imports and return liquors. Altering the discharge pipe of tanker and return liquor to below the water line and ensuring that it is introduced at a point where incoming flows dilute their influence, can reduce the release of odours from this site process.
- If present, ensure that the integrity of the covers are monitored and access/inspection hatches are closed when not in use.
- Ensure that screenings and grit material within skips is frequently disposed of.
- Minimise on areas of turbulence within the channels

3.3 Biological Sewage Treatment

Settled sewage then splits into parallel treatment flows, between 60 to 70% of the flow passes to three structured plastic media biological filters located near the western boundary. The remaining 30% of flow passes to six stone media biological filters located along the eastern boundary. Final effluent is UV disinfected and then discharged into the River Dee

3.3.1 General Odour Considerations for Sewage Treatment

- Odours can be released from these processes if the feeds are highly odorous/septic.
- Odours can be generated quickly from settled sewage during prolonged periods of contact between settled sludge and the liquid layer above it. Therefore, regular and complete de-sludging of primary and final settlement tanks can reduce the odour potential of these processes.
- Increased levels of turbulence can also lead to odour release from Primary Tanks, Secondary treatment, and Final settlement. Up to 75% of the total odour emissions from primary tanks can be attributed to the peripheral walls. The greater the fall, greater the odour emissions that are generated.
- During periods of low flow through the works (summer), consider reducing the number of primary tanks in service to prevent excessive retention time within the primary settlement tanks.
- If containment covers are present, ensure that the integrity of the covers are monitored and access/inspection hatches are closed when not in use.

3.4 Sludge Treatment

Humus sludges are returned to the inlet for co-settlement with primary sludges. The two primary tanks have auto-desludging equipment that transfers co-settled sludges into three covered sludge consolidation tanks.

Sludges are dewatered using a drum thickener (installed as part of the sludge upgrade project, dewatering liquors are returned to the inlet) and fed to two heated anaerobic primary digesters. Digested sludge is then discharged to a variety of holding tanks (currently comprising two open circular tanks, two covered concrete tanks and three open lanes of a decommissioned activated sludge plant). After storage digested sludge is dewatered, to form a cake, using a centrifuge housed in a redundant blower house. Cake is discharged to three bays for loading and transportation for application to agricultural land. Centrate is held within a further lane of the disused activated sludge plant and returned evenly throughout the day to the main process flow.

Balancing tanks, located in the south east corner of the site by the main gate, for the reception and storage of tankered in trade wastes. These wastes are added to the main flow at times of low loading.

3.4.1 General Odour Considerations for Sludge Treatment

- Spillages should be avoided and if they occur, refer to existing site procedures as detailed in the Works Operation and maintenance manual
- Reduction of turbulence during raw sludge handling can reduce the levels of odours released.
- Sludge handling and treatment is a key source of odour on treatment sites
- Excessive handling of sludge should be avoided wherever practicable
- If practicable, resulting liquors from sludge treatment should be ducted directly back to secondary treatment systems or flows balanced through the works to prevent excessive odours being released from the entire plant
- Stabilisation of sludge using lime can prevent odorous releases caused by H₂S and mercaptans, but high ammonia releases can lead to other odours being detected off site.
- Tankering of thickened sludges from sites can also be a source of strong odours
- If present, ensure that the integrity of the covers are monitored and access/inspection hatches are closed when not in use.

3.5 Anaerobic Digestion *(if applicable on the site)*

3.5.1 General Odour Considerations for Anaerobic Digestion *(revise as appropriate for each site)*

- Biogas leakage will result in significant odour release from the site.
- Gas release valves on the digester should be regularly serviced
- If present, ensure that the integrity of the covers is monitored and access/inspection hatches are closed when not in use.

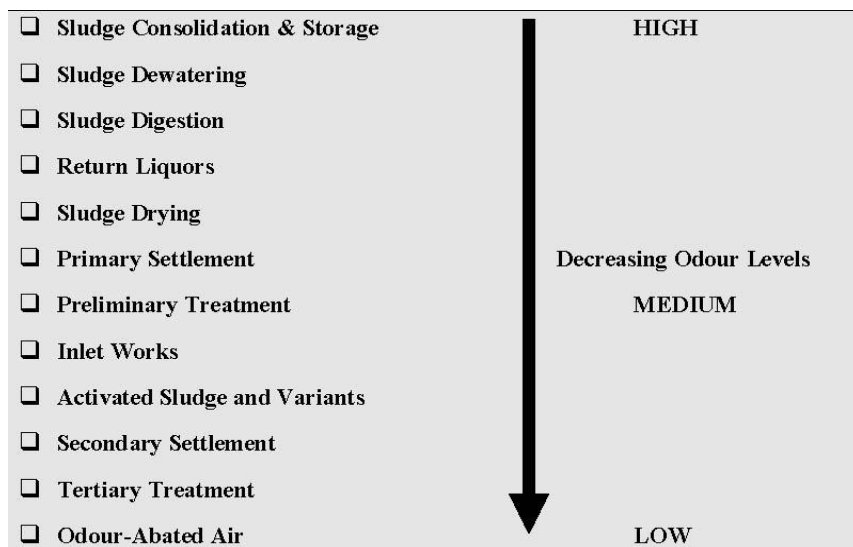
3.6 Storm Water Treatment:

Storm storage capacity is provided within two rectangular storm tanks. Storm flows are transferred back to the inlet works once storm flows have subsided and capacity is available for treatment.

3.6.1 General Odour Considerations for Storm Water Treatment *(revise as appropriate for each site)*

- Minimise the time where storm water is stored within open tanks
- If applicable, ensure storm water storage is aerated and mixed to reduce septicity developing
- Ensure excessive sludges are flushed away during emptying
- If present, ensure that the integrity of the covers are monitored and access/inspection hatches are closed when not in use.

A recent UKWIR report has provided a general categorisation of wastewater treatment sources. The chart below demonstrates that the treatment and handling of sludge on a treatment site will contribute to the greatest risk while secondary and tertiary treatment (if applicable) produce less emissions of odour or odour which is not regarded as being unpleasant. Appendix B describes the items of plant/process which require frequent and planned maintenance.



Atmospheric Dispersion Modelling

To evaluate the impact of each of the three areas of concern, predictive modelling has been undertaken employing the US EPA Aermol atmospheric dispersion model. For this exercise the following was assumed:

- Criteria for odour nuisance is the established indicator of 5ou/m³ (98 percentile) at nearest sensitive receiver
- For Queensferry, historical hourly averaged met data for the years 1998 to 2000 from the met station at Hawarden Airfield was employed (approximately 2 miles to the south east).

Odour modeling has been undertaken for several scenarios:

- Historical scenarios representing identified odour issues based on discussions with site operations and data collected in 2004 & 2005.
- A future situation post odour control improvements.

The odour emission rate estimates used in the compilation of the model scenarios are listed below:

Process Unit	Current Situation	Future Situation after abatement measures
	Odour Units/Second	Odour Units/Second
Primary Tanks	4900	1000
New Filters	24,000	8000
Old Filters	12,000	4000
Inlet Area & Channels	12000	500
Sludge Area	65,000	1000
Total	117,900	14,500

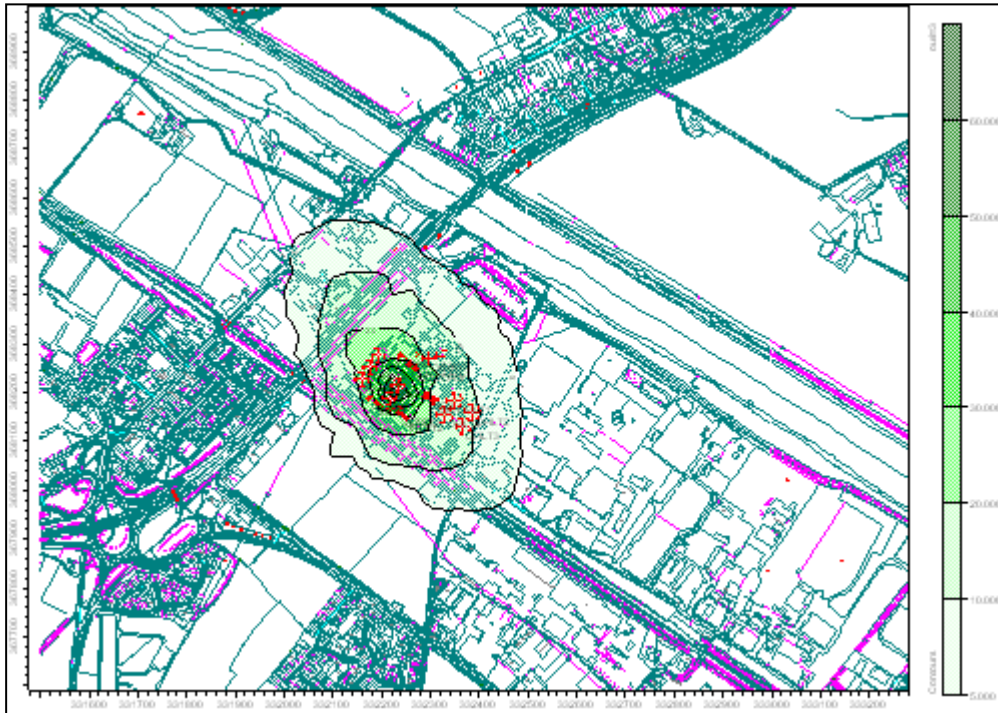
The above figures indicate that completion of the abatement measures will reduce odour emission by nearly 90%. Modeling output for the various scenarios is presented graphically overleaf. The contours indicate the areas in which 5ou/m³ may occur within 98% of the hours within a year. 2% of the hours excluded for when very extreme weather may occur that would affect normal dispersion of odour emitted from the site:

- The plots for the current situations indicate that influent septicity leading to odour emission from the inlet works, primary tanks and filters can lead to the 10ou/m³ contour extending for significant distances across A494 to the west. Emissions from the cake area are less but the resultant 5ou/m³ contours still extend to the west beyond the A494. Both sludge scenarios indicate the 10ou/m³ contour extending to include the A494.
- The plot post abatement shows the 5ou/m³ contour effectively contained within the site boundary. The post abatement scenario includes all the odour sources separately modelled within the current scenarios.

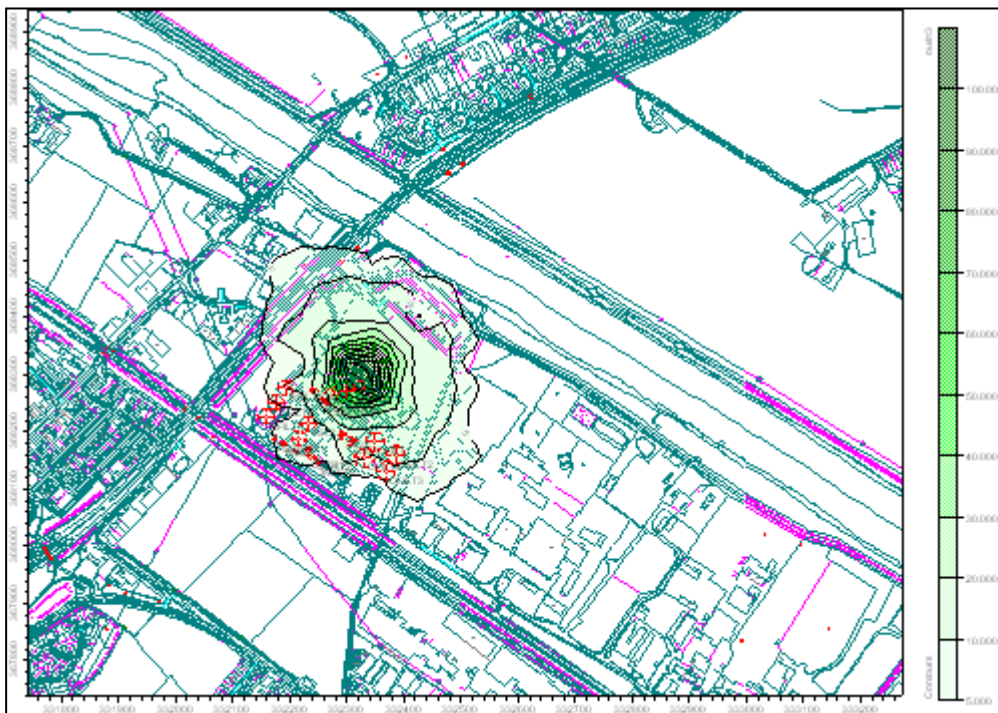
4.0 ODOUR ABATEMENT MEASURES

The site is in a sensitive location Queensferry is a medium sized WwTW approximately 6 miles west of Chester and immediately east of the A494. The North Wales coastal railway runs immediately to the south of the works. The figures below illustrate the dispersion of odour from the site pre and post odour management. These improvements are brought about by capital investment in odour mitigation measures including containment covers and operational procedures set about within the OMP need to be adhered to ensure that the post completion dispersion model is achieved on a day to day basis.

Dispersion Model Output: Historical Scenario Inlet, Primary Tanks and Biological Filters



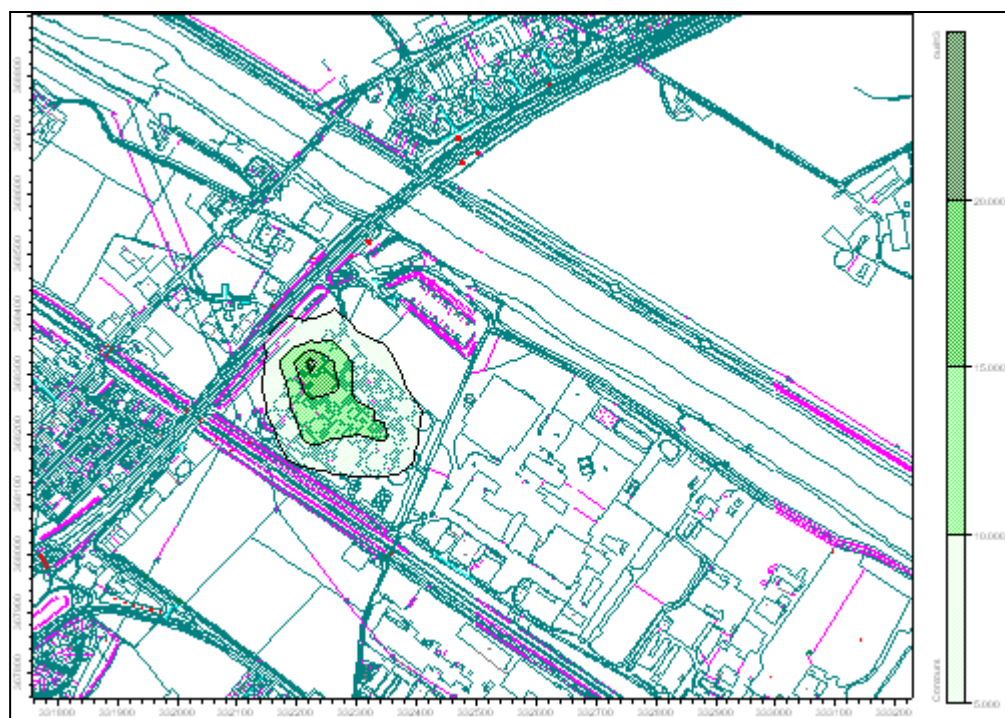
Dispersion Model Output: Current Scenario Raw Sludge Tanks & Thickener



Dispersion Model Output: Current Scenario Sludge Cake Operations



Dispersion Model Output: Future Scenario Post Improvements



Current Odour Control Provision

There are no catchment septicity control dosing installations within the catchment. The following odour control provision is present at the WwTW.

A – Catchment odour control

Dosing of iron salts (typically ferric sulphate) into the crude sewage flow at the works inlet to precipitate dissolved sulphide compounds as insoluble iron sulphides.

B - Main Inlet Works Covers

Inlet channels covered with OCS structural GRP covers as far downstream as the primary tanks

All wells and channels including inlet screens are provided with odour control covers, with the exception of the detritor (a non turbulent, quiescent point). Covered screenings and grit skips are in use. The following items within this area are connected to an OCS Peacemaker dry scrubbing unit

C- Sludge Treatment

sludge consolidation tanks covered with OCS structural GRP covers.

5.0 OPERATIONAL MANAGEMENT PROCEDURES

5.1 Training.

All Operations and Maintenance Staff (including sub-contractors) involved in the operation and maintenance of the works are trained in the relevant systems and processes employed and carry out all works in accordance with that training to ensure safe and efficient operation. The staff have the responsibility to operate and maintain the odour control system in accordance to the Manufacturer's operation and maintenance manual.

5.2 Local Liaison

Should any planned, routine or abnormal operation and/or maintenance activities be required which could carry an unavoidable risk of major odour release, then the Flintshire County Council Environmental Health Officer (EHO) shall be advised by phone of this risk. Should further clarification be required by the EHO, they will contact the site operator or team leader for additional details.

5.3 Odour Complaint Recording.

All Complaints are to be logged through DCWW Operational Contact Centre (OCC) and logged on CRM, these will then be and forwarded to operational staff for investigation, If site contact is made the operator will PROVIDE THE OCC information to the customer so the contact is formally logged.

All customer contact for odour will follow DCWW WO(3) 10 - Odour Control procedures and processes. In which defines in general terms the processes for managing odours reported as relating to DCWW Waste Water Assets.

5.4 Operation and Maintenance of Odour Critical Processes.

In addition to the operation and maintenance schedules set out in Appendix B of this document, there are other processes and equipment where failure, breakdown, and mal-operation could result in heightened levels of odour being produced and released from the site as a whole. These processes, some itemised below, should be operated and maintained in accordance to the procedures and schedules itemised in the sites Operation and Maintenance Manual.

- Chemical supply/pumps for Septicity Prevention)
- Primary Tank desludge pumps
- Sludge Thickening Plant
- Gas Burner (*if applicable*)
- Sludge Export
- Screenings and Grit removal
- Return Liquor procedures
- Sludge/Cake Storage and /or handling
- Whessoe Valves

5.5 Operator Alarm Response Procedures.

Wherever practicable, reaction to varying levels are in accordance with the Operating IMS procedures (Integrated Management System) dependant on priority basis. Reaction from the plant operator would depend on severity following on site investigation and escalated if appropriate to Team Leader / Unit Manager. Actions would be in accordance with plant Operation and Maintenance manuals.

Telemetry alarms are handled by the Control Centre outside normal working hours.

5.7 Faults

All faults are captured and scheduled out to the ME&I team through FieldIT and recorded in SAP.

5.8 General Housekeeping

The site should be operated in such a manner to minimise odour release during general day-to-day operations. Examples of this activity should include the timely removal/clean up of spillages of sewage, sludges and/or cake, maintaining the integrity of odour control covers by ensuring that access and inspection hatches are normally closed and that grit and screening skips are regularly emptied.

6.0 ODOUR MANAGEMENT PLAN REVIEW.

Odour management plans are to be reviewed either; 5 Yearly or When a substantial change of design on site occurs or following receipt of odour complaints confirmed to be from the DCWW asset.