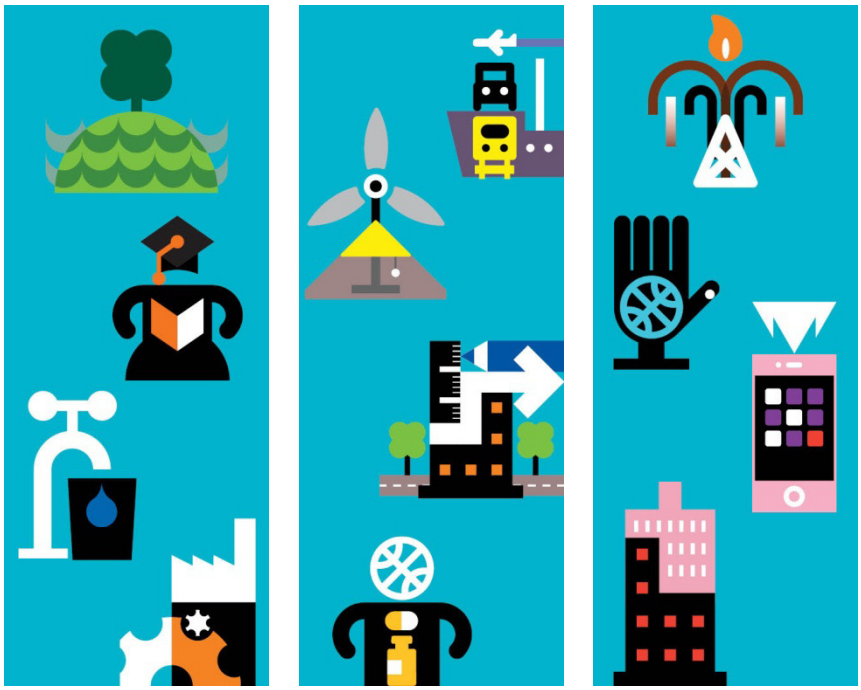

Crymych WwTW - NRW Solutions Document

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September 2016

Dwr Cymru Welsh Water

Mott MacDonald Bentley

Crymych WwTW - NRW Solutions Document

September 2016

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Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
P01	05/09/16	N Kharbanda	W Wormald	W Wormald	For NRW Sign-off

Information class: Standard

Contents

1 Investigations Summary

1.1 Introduction

This Solutions Document presents the information required to issue revised consents for the existing Crymych WwTW in Carmarthenshire. The works has been given an ND1 driver - scheme to meet the requirements of Water Framework Directive (WFD) No Deterioration for ammonia. The biological treatment and humus settlement stages are overloaded and there is insufficient treatment capacity to meet the future ammonia consent.

Investigation work has been undertaken by MMB to review the potential options for the site. It is proposed to implement a solution which replaces the existing works and accommodates for the growth in the catchment. This is in conjunction with a separate scheme within the Crymych network to reduce the infiltration to an acceptable level.

1.2 Investigations Undertaken

A Flow and Load survey was also completed for the works in April 2016, which identified that an existing per capita consumption rate of 150l/h/d is applicable.

Future growth forecasts have been modelled to a design horizon of 2029, with a future per capita consumption rate of 150l/h/d used.

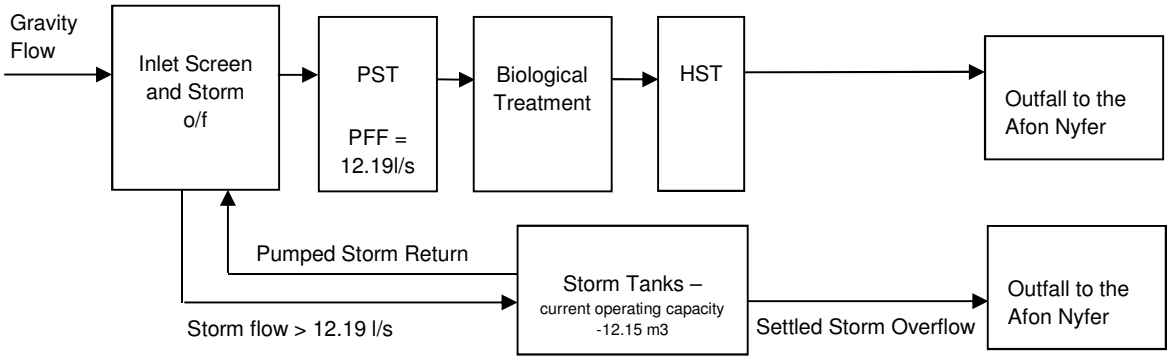
A spill frequency analysis has been undertaken for the existing and future arrangements to predict spill frequency rates, volumes and durations for a typical year. Future predicted spill durations are less than 1% of the typical year, so water quality modelling has not been undertaken.

2 Scheme Summary

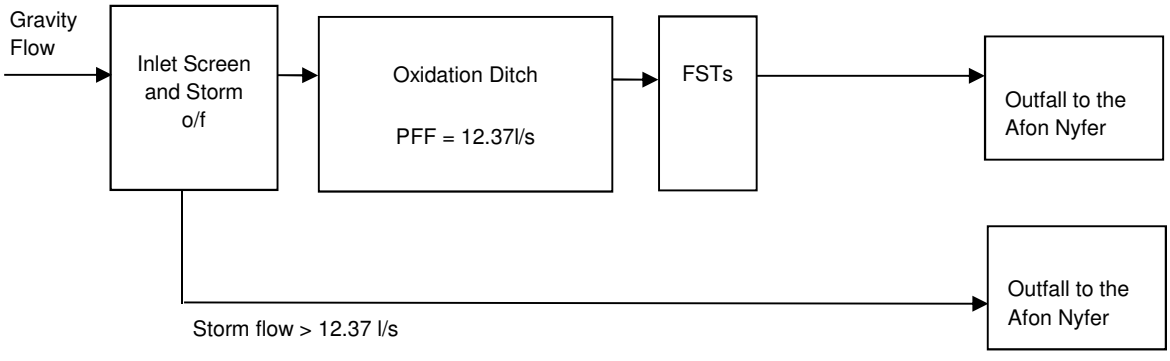
2.1 Existing Performance Summary

Asset Name	Crymych WwTW	**DC Number**	N/A
Driver	Quality	**Consent No**	BP0044401 – Continuous BP0044402 – Intermittent
Receiving Water	Afon Nyfer		

Asset Schematic - Existing



Asset Schematic - Future



3 Narrative Summary

3.1 Existing Situation

All catchment flows arrive at Crymych WwTW by gravity. Flows are screened and gravitate to the Primary Settlement Tanks (PST) up to the Pass Forward Flow (PFF) of 12.19l/s. Treated effluent discharges to the Afon Nyfer. Flows in excess of 12.19 l/s overtop the storm weir downstream of the inlet screen and gravitate to the storm tanks. Settled storm sewage overflows to the Afon Nyfer when the storm tanks are full. The settled storm outfall is slightly upstream of the Final Effluent discharge point.

The existing storm tanks are in poor structural condition. The tanks do not fill to top water level, and flows discharge to the watercourse when the tanks are filled to approximately 300mm depth.

An existing consumption figure of 150l/h/d is applied based on Flow and Load survey results, MCerts flow data and June Return population data.

There is currently very high infiltration of 180m^3/d in the catchment which equates to 149% of PG.

3.2 Future Proposal

Crymych WwTW has been given an ND1 driver - scheme to meet the requirements of Water Framework Directive (WFD) No Deterioration for ammonia. To provide opportunity for development a 2029 design horizon will result in a future total population equivalent of 1,291PE.

The future consumption figure applied for this document of 150l/h/d and growth is included for the forecast 2029 design horizon.

An infrastructure scheme will be undertaken to reduce high infiltration from 180m^3/d to 93m^3/d. Future DWF has been calculated based on the future reduced infiltration.

A new inlet works and associated grit removal will screen all incoming flows to 6mm 2D, with a storm overflow weir located downstream of the screens. The works will treat an FFT of 6DWF (12.37 l/s), with flows in excess of this passing over the storm overflow weir. Since the works is a 6DWF works, it is proposed that the existing storm tanks are abandoned and the storm overflow discharges directly to the stream via the existing storm outfall. A storm spills assessment has been undertaken to assess the impact of this proposal.

A new treatment process comprising an oxidation ditch and radial scraped final settlement tanks will be constructed to meet the ammonia driver. Final effluent quality will be significantly improved and there will be a consequent environmental benefit to the receiving watercourse.

4 Site Spill Details

Existing		Future Situation - Post Solution	
Soc A l/s	19.86	**Soc A l/s**	23.77
6DWF l/s	12.19	**6DWF l/s**	12.37
Storm overflow setting l/s	12.19	**Storm overflow setting l/s**	12.37
Existing Storage m^3	12.15 (currently tanks only fill to 0.3m depth)	**Future storage m^3**	0

Inland Discharge Analysis				
Receiving Waterbody Number	Discharging to Nyfer - Headwaters to confluence with Brynberian – GB110061038510 (SAC and N2K)			
Water Framework Directive Status	Overall 2015 Status is Moderate for failures for Fish and Phosphorus, Elemental status of Dissolved Oxygen and Ammonia is High.			
Existing		**Future Situation - Post Solution**		
	Total		**No storm tanks**	
No. Spills	25	**No. Spills**	24	
No. Spills >50m^3	10	**No. Spills >50m^3**	9	
Spill Volume m^3	1568.2	**Spill Volume m^3**	1497.5	
Annual Spill analysis %age (typical year)	0.317	**Annual Spill analysis %age (typical year)**	0.293	
Existing Water Quality 99%ile	**BOD** N/A	**Future Water Quality 99%ile**	**BOD** N/A	

Screening			
Existing	6mm 2D	**Future**	6mm 2D

Emergency Provision	**Tick boxes**	
	Existing	**Future**
1-2 hours storage at 3DWF (volume and length of time at 3DWF)	N/a	N/a
Telemetry	Y	Y
Standby Pumps	N/a	N/a
Standby Generation	N	Plug in point
Access for tankers	Y	Y
Other (Please specify)		

5 Solutions Detail

5.1 Site Summary

Asset	Current									Future								
	P	G	I	E	DWF	6DWF (consented)		SOC A		P	G	I	E	DWF	6DWF (consented)		SOC A	
		l/h/d	m^3/d	m^3/d	m^3/d	m^3/d	l/s	m^3/d	l/s		l/h/d	m^3/d	m^3/d	m^3/d	m^3/d	l/s	m^3/d	l/s
Crymych catchment	1041	150	180	0	300	902	12.19	1716	19.86	1322	150	93	0	256	1069	12.37	2054	23.77

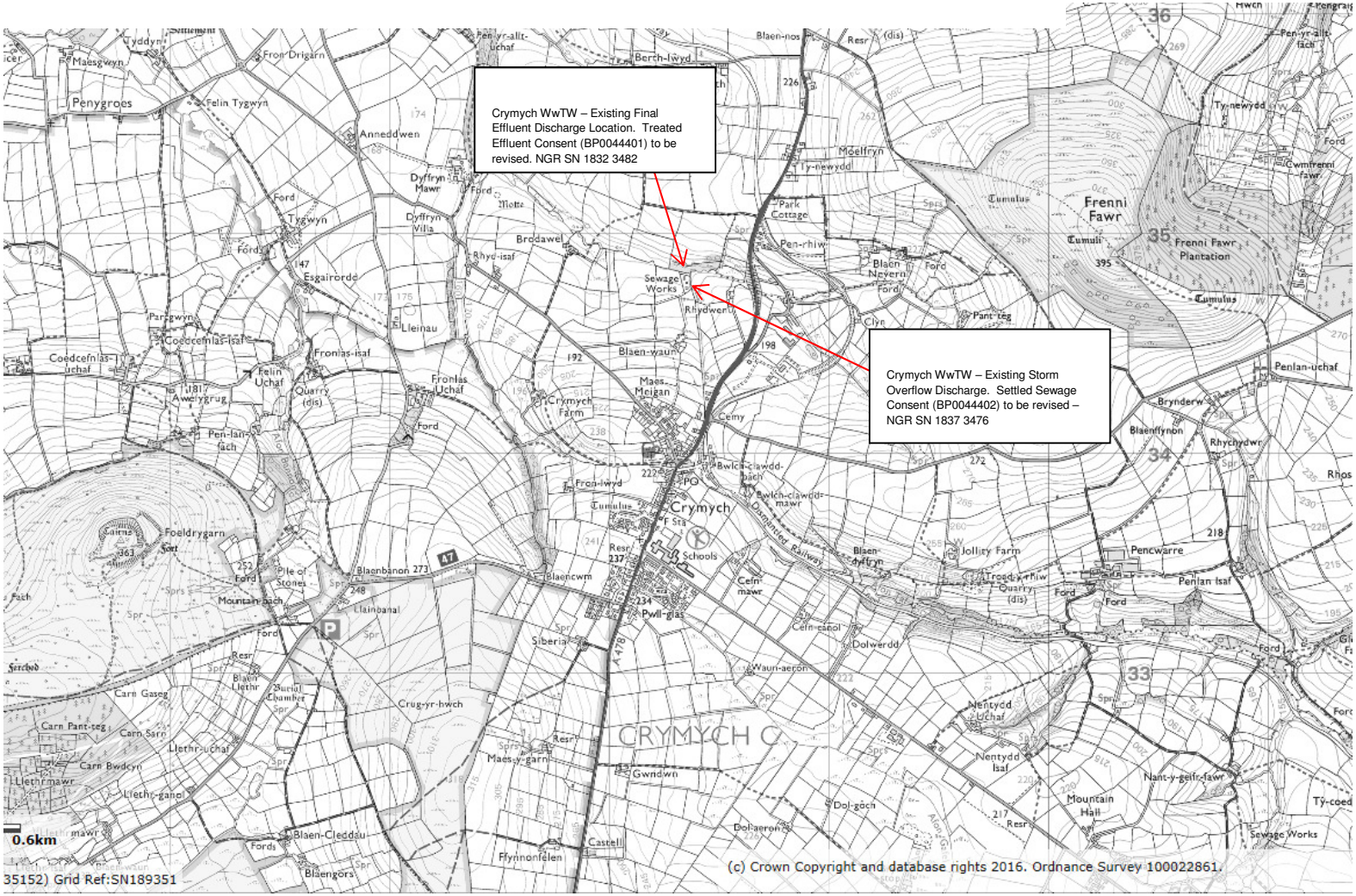
** Note that current DWF values are actual observed values for the site, not the existing consent parameters.*

*** There is currently very high infiltration in the catchment and an infrastructure scheme will be undertaken to reduce this. Future DWF has been calculated based on the future reduced infiltration.*

5.2 Typical Year Spill Analysis & Screening Requirements

Spill Location	Existing				Future				Watercourse Amenity Rating	Screening Requirement	Screening Provided
	Spills/yr	Spill Volume	%age Duration	Spills/yr >50m^3	Spills/yr	Spill Volume	%age Duration	Spills/yr >50m^3			
Crymych Storm Overflow	25	1568.2	0.317%	10	24	1498	0.293%	9	-	None	6mm 2D screening

6 Scheme Map


Crymych WwTW – Existing Final Effluent Discharge Location. Treated Effluent Consent (BP0044401) to be revised. NGR SN 1832 3482
Crymych WwTW – Existing Storm Overflow Discharge. Settled Sewage Consent (BP0044402) to be revised – NGR SN 1837 3476
Crymych
CRYMYCH C.
Penygroes
Frenni Fawr
Sewage Works
0.6km
(c) Crown Copyright and database rights 2016. Ordnance Survey 100022861.

7 Sign-off Sheets

7.1 Solutions Summary Signoff

7.2 Storm Discharge Signoff

SCHEME NAME : Crymych WwTW - Quality

Treated Effluent Summary

THE DATA IN THE FOLLOWING TABLE WILL BE TAKEN AS THE INFORMATION EXPECTED ON THE CONSENT APPLICATION

		Crymych Final Effluent			
		EXISTING	PROPOSED		
ASSET	DC Number	N/A	N/A		
	Consent Number	BP0044401	BP0044401		
POP		Estimated	Design		
	Population	1041	1322		
NGR	WRA discharge point	SN 1832 3482	SN 1832 3482		
	WRA sample point	SN 1832 3479	SN 1832 3479		
	UWWTD influent (gravity)	N/A	N/A		
	UWWTD influent (industrial)	N/A	N/A		
	UWWTD treated sample point	N/A	N/A		
	UV Crude	N/A	N/A		
	UV pre	N/A	N/A		
	UV post	N/A	N/A		
	Flow measurement	SN 1832 3479	SN 1832 3479		
FLOW	Max daily flow m^3/d	1053	1069		
	Max rate l/s	12.19	12.37		
	DWF m^3/d	300	256		
WRA CONSENT	BOD mg/l	15	14.5		
	BOD UT mg/l				
	SS mg/l	25	21.5		
	SS UT mg/l				
	Ammonia mg/l	10 Winter / 5 Summer	3		
	Ammonia UT mg/l				
	Total Iron UT mg/l	N/A	N/A		
UWWTD CONSENT	U1/U2/U3	N/A	N/A		
	Phosphorus mg/l	N/A	N/A		
	Total N mg/l	N/A	N/A		
UV	Measured applied dose	N/A	N/A		
	Applied dose	N/A	N/A		
MEMBRANE	disinfection	N/A	N/A		
	high quality	N/A	N/A		
COMMENTS					

Accepted by NRW

Name …… Date……

DCWW No.	Consent No.	Name	Discharge NGR	Current	Future (2029)	Screens (type & size)	Storage	No. of spills per annum		Comments (NRW use)
				FFT	FFT			Current	Proposed	
				l/s	l/s		m^3			
N/A	BP0044402	Settled Storm Sewage	SN 1837 3476	12.19	12.37	Mechanical 6mm 2D	0	25	24	

Statement of Acceptance by NRW here

Signed: **Date:**

Name:

Title:

Comments / Subject To: