

NETHERLANDS

The Hague Waste Water treatment scheme



■ WASTE WATER GENERAL DATA

Location (Municipalities served, region...)	Nord Delfland (La Haye, Delft, and 15 surrounding municipalities)
Client	HOOGHEEMRAADSCHAP VAN DELFLAND Phoenixstraat 32 2611 AL Delft Contract Manager : Mr. Jaap Bos Tel : + 31 15 270 19 71
Operating Company	DELFLUENT B.V. (SPC) (40 % owned by Veolia Water) DELFLUENT SERVICES B.V. (O&M) (50% owned by Veolia Water) Contract Manager : David Alexandre, Benelux Director of Veolia Water Einsteinlaan 10 2289 CC RIJSWIJK Téléphone: +31 70 300 21 14
Date of award (implementation)	05/12/2003
Date of completion	04/12/2033
Type of the contract	Design Built Finance Operate
Annual turnover (in € and US \$)	Concessionnaire : 49 M€ ; O&M : 20 M€.
Total amount of the contract (in € and US \$)	1470 M€
Estimated amount of investments (in € and US \$)	Investissement initial : 350 M€
Estimated annual amount of investments (in € and US \$)	
Population served in waste water	1.7 millions éq hab
Number of users	
Number of connections	
Volumes collected (m ³ /year)	
Volumes treated (m ³ /year)	116.300.000
Volumes billed (m ³ /year)	116.300.000
Length of waste water separate system (km)	0
Length of rain water separate system (km)	0
Length of the combined system (km)	90 km
Waste water treatment site	19 pumping stations Newly built plant (Harnaschpolder): 254,900 m ³ /d (average) 35,800 m ³ /h (peak flow) Refurbished plant (Houtrust): 63,700 m ³ /d (average) 13,900 m ³ /h (peak flow)

■ RESPONSIBILITY OF THE VEOLIA WATER

Total ● Partial ○	Waste water	
	Collection	Treatment
Assets owner		●
Technical management	○	●
Assets renewal	○	●
Extension of the system and reinforcement	○	●
Administrative management	○	●
Customer's management		

Delfluent finances the construction works of Harnaschpolder and the refurbishment works of Houtrust. Delfluent has the concession rights but is not "Assets owner" on a legal aspect.

■ GENERAL DESCRIPTION OF THE CONTRACT, PARTICULAR ISSUES AND SOLUTION ADOPTED BY VEOLIA WATER

Since December 2003, and for a 30 year-period, VEOLIA WATER, via the DELFLUENT B.V. is in charge to:

- To Design, to finance, to build the new waste water treatment plant of Harnaschpolder, to refurbish the waste water treatment plant of Houtrust and to operate the new infrastructures,
- To operate the existing installations (Houtrust waste water treatment plant and Transport System)

The Design, financing and construction/refurbishment of the Transport System is the client's responsibility.

Construction period: 5 years (3.5 years to construct the new plant of Harnaschpolder and 1.5 to refurbish the plant of Houtrust in two phases)

The scope of operation starts at the entry points of the Transport System of the collected waste and rain water (90 km of network and 17 pumping stations). For the water treatment, it ends at the discharge of treated water into the North Sea. For the sludge treatment, it ends at the making available of the dewatered sludge to be transported by the Client to the DRSH incineration plant.

Call for tender and preparation of the Contract

This project has taken 4 years to prepare: 1 year for the client to define the scope of the project and prepare the call for tender, 2 years to prepare the offers (1 offer, then 2 best and final offers), which lead to a Project Development Agreement between the Client and the Delfluent consortium (preferred bidder). Finally, 1 year to negotiate the project contracts, all of which were finally signed on 5 December, 2003, including:

- a Design, Build, Finance & Operate contract between the Client and Delfluent;
- an Engineering, Procurement & Construction contract between Delfluent and the Building Consortium;
- an Operation & Maintenance contract between Delfluent and Delfluent Services;
- a series of financing contracts between Delfluent, the arranging banks (Dexia and Rabobank) and the European Investment Bank (EIB).

After signing the Project Development Agreement in November 2002 the Building Consortium was able to initiate the design and detailed engineering phases before the definitive contracts were signed, so as to avoid jeopardizing the Client's schedule. Veolia Water, the leader of the consortium that won the call for tender, still plays a paramount role within Delfluent (Board chairmanship), Delfluent Services (2 out of 3 Directors) and the Building Consortium (OTV leader).

Contract structures:

The Project Company (DBFO Co) shareholders are:

- Veolia Water Group (40%)
- Evides (40%)
- Rabobank (10%)
- Heijmans (5%)
- Strukton (5%)

The DBFO Co will subcontract:

- the construction works to an EPC Consortium the partners of which are :
 - OTV (as leader)
 - Rossmark
 - Heijmans
 - Strukton
- the Operation and Maintenance activities to an O&M Company named Delfluent Services BV, the shareholders of which are :
 - Veolia Water (50%)
 - Evides (50%)

Financing

The project is financed by a 27-year bank loan provided by Rabobank and Dexia (amount: 165 million EUR, i.e. 199.25 million USD) and a 27-year loan from the EIB (amount: 125 million EUR, i.e. 150.95 million USD).

Rabobank International and Dexia Credit Local are the arranging banks of a 362.5 million EUR (437.76 million USD) loan, including a 125 million EUR (150.95 million USD) contribution from the European Investment Bank. This loan was syndicated in May 2004 to involve the following banks: Bank Nederlandse Gemeenten, Banca OPI SpA, KfW IPEX-Bank, ING Bank, Bank of Ireland, Natexis Banques Populaires, Fortis Bank, and Landesbank Hessen-Thüringen Girozentrale.

■ HUMAN RESOURCES MANAGEMENT :

Delfluent

A small team of Delfluent shareholders' staff members was commissioned to manage the interfaces between the Client, Delfluent Services, the EPC and the banking pool representative.

Delfluent Services

The whole Operations team working for Delfland at the Houtrust plant (i.e. 43 people) was transferred to Delfluent Services in December 2003. As the Delfluent Services shareholders, Veolia Water and Evides support this team provided by the Client, particularly in the following areas:

- Interfaces with EPC, Harnschpolder design monitoring and upgrading of the Houtrust plant;
- Management of relations with the EPC and the Client (including contractual relations);
- Implementation of a 30-year Asset Management plan;
- Management control and financial reporting procedures.

This support consists in providing personnel (2.5 full time positions) and facilitating occasional expert interventions provided for in a Technical Assistance Framework Contract. Meetings and experience sharing sessions organised between the personnel from Delfland and the Compagnie Générale des Eaux operators in France and Europe are a motivation catalyst much appreciated by Delfluent Services personnel.

Since 2003, because of its active role in reviewing the design, build and assembly of the Harnaschpolder plant, and in preparation of the plant operation, the staff was increased to reach 54 people at the end of 2006.

■ ACHIEVEMENTS BY MID-2007

- The Harnaschpolder plant was commissioned 5 months early (intermediate certificate reception/delivery on 19 December, 2006) and was inaugurated by the Crown Prince of Holland on 28 March, 2007, in the presence of Henri Proglio.
- The upgrading work at Houtrust was launched in January 2007, and the project 1st phase commissioning is underway 4 months early.
- No non-compliance in the operation of the plants since the beginning of the contract, with significantly improved performances in terms of discharged water quality and sludge volume, based on the contractual commitments.
- The partnership between the Client and Delfluent has notably resulted in expertise mobilization as well as specific achievements in two of the Client's main matters of concern:
- Nitrogen treatment and compliance with the European Directive ahead of the Harnaschpolder plant commissioning: implementation of a treatment process for sludge centrifugation concentrates at Houtrust (Sharon process);
- Asset Management: development of a 30-year Asset Management plan, the Client being entitled to audit the procedures for renewal plan determination.

■ QUALITY APPROACH

Delfluent (SPC), Delfluent services (O& M) and Bahr (EPC) awarded ISO 9001:2000 certification at the beginning of the project to comply with contractual commitments.

■ CHARACTERISTICS OF THE WASTE WATER TREATMENT PLANTS:

WASTE WATER TREATMENT PLANT: HARNASCHPOLDER				
Constructor – Date of set-up: OTV 2003/2006 Number of employees working on site				
Nature : New	Type : Traditional	Situation : Above ground	Capacity 254,000 m ³ /d pop equi : 1.3 Dry weather hydraulic nominal capacity: 201,000 m ³ /d Hydraulic peak flow: 35,800 m ³ /h	Eau Brute : % Domestic effluents % Industrial effluents
<input checked="" type="checkbox"/> WATER TREATMENT		DISCHARGE : North Sea		
Pretreatment <input type="checkbox"/> Relift pumping <input checked="" type="checkbox"/> Screening <input type="checkbox"/> Rectangular grit removal <input type="checkbox"/> Circular grit removal		<input type="checkbox"/> Storm or buffer tank <input type="checkbox"/> Biological treatment of grease <input type="checkbox"/> Grit removal <input type="checkbox"/> Lagooning		Primary treatment <input type="checkbox"/> Lamella settling <input checked="" type="checkbox"/> Standard primary settling
Secondary treatment <input type="checkbox"/> Activated sludge – low load <input type="checkbox"/> Activated sludge – high load <input type="checkbox"/> Activated sludge – medium load <input type="checkbox"/> Activated sludge – nit/denit <input checked="" type="checkbox"/> Activated sludge nit/denit + phosphorus biological treatment + Coprecipitation <input type="checkbox"/> Activated sludge nit/denit + Phosphorus physico-chemical treatment		<input type="checkbox"/> Activated sludge – Contact stabilisation <input type="checkbox"/> Activated sludge – Immersed membranes <input type="checkbox"/> Activated sludge – SBR <input type="checkbox"/> Aeration ditch <input type="checkbox"/> Lamella clarification <input checked="" type="checkbox"/> Standard clarification <input type="checkbox"/> Clarification - membranes <input type="checkbox"/> Biofilters - secondary nitrification <input type="checkbox"/> Biofilters - tertiary nitrification <input type="checkbox"/> Biofilters - nit/denit <input type="checkbox"/> Biofilters – Simultaneous nit/denit		<input type="checkbox"/> Biofilters - simultaneous nit/denit + Post denit <input type="checkbox"/> Biofilters - Carbonate <input type="checkbox"/> Biofilters - Carbonate/Secondary Nit/Nit/denit <input type="checkbox"/> Biofilters - Post denitrification <input type="checkbox"/> Trickling filters <input type="checkbox"/> Biofilters – Other type <input type="checkbox"/> Anaerobic treatment
Tertiary treatment <input type="checkbox"/> Tertiary sand filtration <input type="checkbox"/> Actiflo <input type="checkbox"/> Rotating drum		<input type="checkbox"/> Membranes (type or membranes must be indicated) <input type="checkbox"/> Chlorine disinfection <input type="checkbox"/> Ozone disinfection		<input type="checkbox"/> Peracetic Acid disinfection <input type="checkbox"/> UV Disinfection
Details of process and equipments : (Name of process and licensee – Name of equipment and constructor) NIJHUIS PUMP – Grundfos – Mixers, Howden (compressors), MPR, Hach Lange				
<input checked="" type="checkbox"/> SLUDGE TREATMENT :		END USE : Dewatered sludge were transported on another site for incineration		
<input checked="" type="checkbox"/> Static thickening (Gravity) <input type="checkbox"/> Lamellar settling <input type="checkbox"/> Flotation <input type="checkbox"/> Aerobic digestion <input checked="" type="checkbox"/> Anaerobic digestion (with Cogeneration) <input type="checkbox"/> Nitrite stabilisation		<input type="checkbox"/> Dewatering by belt filter <input type="checkbox"/> Dewatering by filter press <input type="checkbox"/> Dewatering by drying beds <input checked="" type="checkbox"/> Dewatering by centrifuge <input type="checkbox"/> Dewatering by screw press <input type="checkbox"/> Dewatering by vibrating tables		<input type="checkbox"/> Lime treatment <input type="checkbox"/> Mean thermal drying (50 - 70 %) <input type="checkbox"/> Advanced thermal drying (90 - 95 %) <input type="checkbox"/> Incineration <input type="checkbox"/> Composting <input type="checkbox"/> Sludge oxidation
Quantity of sludge produced (Tons SS/d) : 50 t/d 210 @ 24 %				
Details of process and equipments : (Name of process and licensee – Name of equipment and constructor) 4 grease pumps – 8 selectors tanks – blowers: 4 + 2 standby – 3 + 1standby centrifuges thickening – 3 +1standby centrifuges dewatering				
<input checked="" type="checkbox"/> ODOUR TREATMENT		Smoke treatment : <input type="checkbox"/>		
Type of odour removal : <input type="checkbox"/> Chemical <input checked="" type="checkbox"/> Biological				
Details of process and equipments : (Name of process and licensee – Name of equipment and constructor) Biological autotrophic odour removal treatment				
<input checked="" type="checkbox"/> BIOGAZ RECOVERY				
<input type="checkbox"/> ADDITIONAL TREATMENT				

	Effluent Kg/j	Discharge mg/l	Standards required mg/l
BOD ₅		5	20
COD		30	125
SS		8	30
NH ₄ -N		9	10
PT		0.6	1



Harnaschpolder waste water treatment plant

WASTE WATER TREATMENT PLANT: HOUTRUST

Constructor – Date of set-up : OTV 2007/2008

Number of employees working on site

Nature : New/Rehabilitation	Type : Compact	Situation : Above ground	Capacity 63,000 m ³ /d pop equi : 0.4 Dry weather hydraulic nominal capacity: m ³ /d Hydraulic peak flow : 13,900m ³ /h	Eau Brute : % Domestic effluents % Industrial effluents
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WATER TREATMENT **DISCHARGE : North Sea**

Pretreatment		Primary treatment	
<input type="checkbox"/> Relift pumping	<input type="checkbox"/> Storm or buffer tank	<input type="checkbox"/> Lamella settling	<input checked="" type="checkbox"/> Standard primary settling
<input checked="" type="checkbox"/> Screening	<input type="checkbox"/> Biological treatment of grease		
<input type="checkbox"/> Rectangular grit removal	<input type="checkbox"/> Grit removal		
<input type="checkbox"/> Circular grit removal	<input type="checkbox"/> Lagooning		

Secondary treatment			
<input type="checkbox"/> Activated sludge – low load	<input type="checkbox"/> Activated sludge – Contact stabilisation	<input type="checkbox"/> Biofilters - simultaneous nit/denit + Post denit	
<input type="checkbox"/> Activated sludge – high load	<input type="checkbox"/> Activated sludge – Immersed membranes	<input type="checkbox"/> Biofilters - Carbonate	
<input type="checkbox"/> Activated sludge – medium load	<input type="checkbox"/> Activated sludge – SBR	<input type="checkbox"/> Biofilters - Carbonate/Secondary Nit/Nit/denit	
<input type="checkbox"/> Activated sludge – nit/denit	<input type="checkbox"/> Aeration ditch	<input type="checkbox"/> Biofilters - Post denitrification	
<input checked="" type="checkbox"/> Activated sludge nit/denit + phosphorus biological treatment + Coprecipitation	<input type="checkbox"/> Lamella clarification	<input type="checkbox"/> Trickling filters	
<input type="checkbox"/> Activated sludge nit/denit + Phosphorus physico-chemical treatment	<input checked="" type="checkbox"/> Standard clarification	<input type="checkbox"/> Biofilters – Other type	
	<input type="checkbox"/> Clarification - membranes	<input type="checkbox"/> Anaerobic treatment	
	<input type="checkbox"/> Biofilters - secondary nitrification		
	<input type="checkbox"/> Biofilters - tertiary nitrification		
	<input type="checkbox"/> Biofilters - nit/denit		
	<input type="checkbox"/> Biofilters – Simultaneous nit/denit		

Tertiary treatment		
<input type="checkbox"/> Tertiary sand filtration	<input type="checkbox"/> Membranes (type or membranes must be indicated)	<input type="checkbox"/> Peracetic Acid disinfection
<input type="checkbox"/> Actiflo	<input type="checkbox"/> Chlorine disinfection	<input type="checkbox"/> UV Disinfection
<input type="checkbox"/> Rotating drum	<input type="checkbox"/> Ozone disinfection	

Details of process and equipments : (Name of process and licensee – Name of equipment and constructor)
 GRONTMIJ (NL)
 Grondfos
 KSB – H HasCopco - Invert
 2 pumping station – 3 bar screens – 2 selector tanks – 6 primary settling – 8 lines aeration tanks – 32 secondary settling tanks

SLUDGE TREATMENT : **END USE: Dewatered sludge were transported on another site for incineration**

<input checked="" type="checkbox"/> Static thickening	<input type="checkbox"/> Dewatering by belt filter	<input type="checkbox"/> Lime treatment
<input type="checkbox"/> Lamellar settling	<input type="checkbox"/> Dewatering by filter press	<input type="checkbox"/> Mean thermal drying (50 - 70 %)
<input type="checkbox"/> Flotation	<input type="checkbox"/> Dewatering by drying beds	<input type="checkbox"/> Advanced thermal drying (90 - 95 %)
<input type="checkbox"/> Aerobic digestion	<input checked="" type="checkbox"/> Dewatering by centrifuge	<input type="checkbox"/> Incineration
<input checked="" type="checkbox"/> Anaerobic digestion	<input type="checkbox"/> Dewatering by screw press	<input type="checkbox"/> Composting
<input type="checkbox"/> Nitrite stabilisation	<input type="checkbox"/> Dewatering by vibrating tables	<input type="checkbox"/> Sludge oxidation

Quantity of sludge produced (Tons SS/d) : 9.5 T SS/D 45 @ 22 %

Details of process and equipments : (Name of process and licensee – Name of equipment and constructor)
 3 primary thickeners – 4 thickening centrifuges – 2 digestion tanks – 4 dewatering centrifuges

ODOUR TREATMENT

Type of odour removal : Chemical Biological Smoke treatment :

Details of process and equipments : (Name of process and licensee – Name of equipment and constructor)
 Existing chemical deodorisation scrubbers
 Existing activated carbon filters
 New biological autotrophic odour removal treatment

BIOGAZ RECOVERY

ADDITIONAL TREATMENT

	Effluent Kg/j	Discharge mg/l	Standards required mg/l
BOD ₅		10	20
COD		60	125
SS		5	30
Ntol		-	13
PT		1.5	3



Houtrust waste water treatment plant