

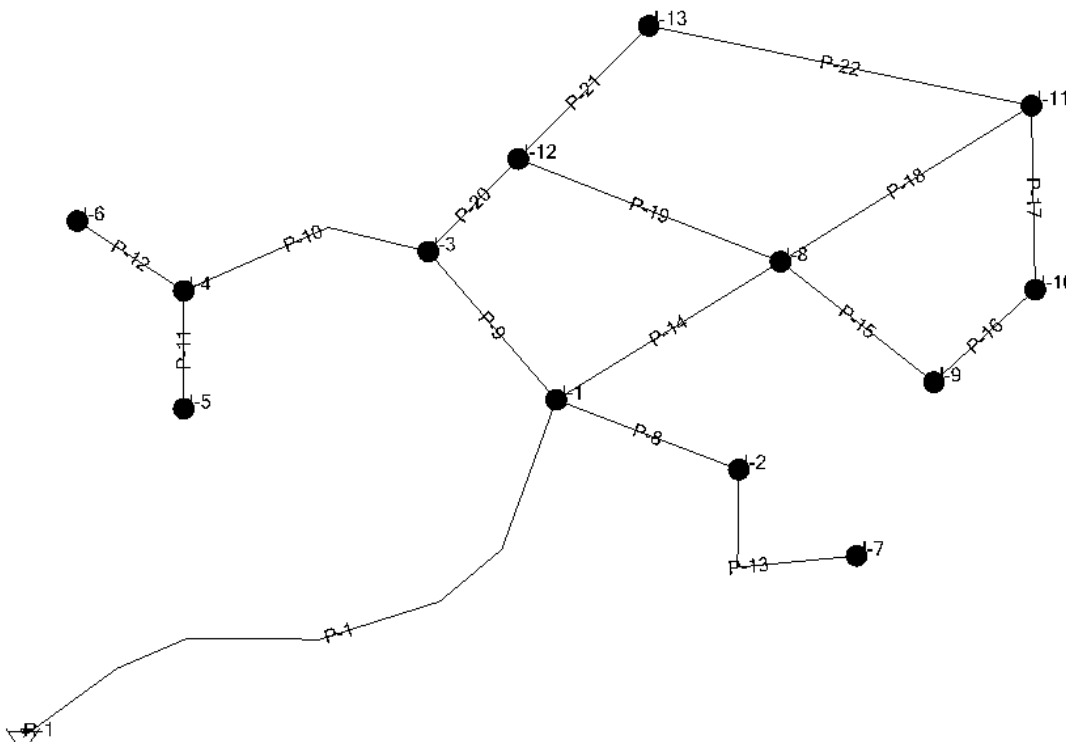
Cours Watercad

1) Créer un nouveau projet

Utilisation de l'interface de Bentley WaterCAD et l'interface d'AutoCAD.



1. Tools > Options > Units. System International SI, Defaults : System International.
2. Drawing – plot Scale Factor 1 cm = 5 m.
3. OK.

2) Tracer le réseau




1. Sélectionner Pipe de la barre d'outils.
2. Click droit - Reservoir.
3. Cliquer pour placer R-1.
4. De la même façon – pompes, jonctions, et pour finir - Done.
5. File > Save.




3) Entrer les données




- Dialog Boxes—double-click.
- FlexTables—.
- User Data Extensions—.

4) Run : Steady-State Analysis



1. Click  - Calculation Options box.
2. Double-click ou click- droit sur Base Calculation Options sois sûr que Time Analysis Type est : Steady State.

Calculation Times	
Base Date	1/1/2000
Time Analysis Type	Steady State
Use Simple Controls?	True
Is EPS Snapshot?	False
Start Time	12:00:00 AM


3. Valider , ---- no problems are found.
4. Click Compute  pour analyser le modèle.
5. Save  project.

- 3) Utiliser **element symbologie** pour : Label.....(annotation – color coding..., open legend....)
- 4) Utiliser  **TRex** pour mettre donner les élévations des éléments avec les contours (DXF ou SHP)
- 5) Utiliser Demand control center  pour introduire les demande de base (L/s, m³/d.....)
- 6) Utiliser Flex table  dans le même contexte (pipe, jonction.....) et por voir les resultats ainsi (statistics, filter-custom, query builder...).

5) Extended Period Simulation ‘EPS’

1. components – Patterns –Hydraulic – New (residential).
2. Entrer les facteurs multiplicateurs (hourly , daily, monthly...).
3. Demand Control Center (Pattern - Global Edit).
4. Click  - Calculation Options box.
5. Double-click ou click- droit sur Base Calculation Options sois sûr que Time Analysis Type est : EPS.
6. Run
7. EPS results browser 

6) THIESSEN

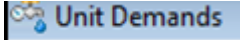
Utiliser Polygon Thiessen Creator  pour faire le partage pour chaque jonction dans un contour donné

- Node layer (jonctions/Elements).
- Polygon Boundary (le contour donné).
- Output file (sauvegarder le partage et nommer le exemple AAA).
- BackgroundLayers - New File et sélectionner le fichier AAA. Et on aura pour chaque nœud sa propre surface.

NB : On peut avoir pour chaque nœud le nombre de lot dans sa surface.




Exemple : pour le nœud 10 nous avons :

- 15 lots autour de la jonction 10.
- Lot R+1 - 2 appartements par etage - 6 personnes par appartement - 120 litres/personne. jour
- Le calcul s'effectuera comme suit :
 $120 \times 4 = 480 \text{ l/j}$
 $480 \times 6 = 2880 \text{ l/j}$
 $2880 / 24 = 120 \text{ l/h}$
 $120 / 3600 = 0.03 \text{ l/s}$
15 lots autour de la jonction 10 par exemple donc $15 \times 0.03 = 0.45 \text{ l/s}$

- On introduit cette valeur 0.03 l/s dans Unit Demand 
- Puis dans proprietes de la jonction 10 – Unit Demand Collection – (number of Unit Demand s= 15) – (Demand Base = 0.45 L/s).

7) ALTERNATIVES ET SCENARIOS

Exemple : On veut augmenter la de mande de quelques nœuds (j8 et j10) de 50 %.

- 1) Alternatives  - Demand – click droit – New – Children Alternative – (j8,j10).
- 2) Double-click (j8,j10) – Demand(junction) – j8 (Demand Base: de 700 à 1050), puis cocher j8
- 3) De même pour j10 (de 900 – 1350).
- 4) Scenarios  - Base – Child Scenarion – 50% plus.
- 5) Double-click 50% plus. – Properies Scenarion – Demand (j8,j10) (Label : 50% plus).
- 6)  pour base et 50% plus.

Definition de pompes

$200 \times 76 = 15200 \text{ m}^3/\text{j}$ (76 jctions et 200m³/j chacune)

$15200/2 = 7600$ par pompe

Pump Definitions

Pump Definition Type: Design Point (1 Point)

	Flow (m ³ /d)	Head (m)
Shutoff:	0.00	40.00
Design:	7,600.00	30.00
Max. Operating:	15,200.00	0.00

Head (m)

Flow (m³/d)

Pump Efficiency (%)

Coefficients: a = 40.00 m; b = 1.731e-007 m/(m³/d)^c; c = 2.000

Close Help

The image displays a software interface for a network diagram. On the left, a network of nodes and pipes is shown. Nodes are labeled P-1, P-2, P-3, P-4, and P-5. A red arrow points from a node labeled PMP-1 to node P-3. A red circle highlights a node in the network. On the right, a properties panel is open, showing the following data:

ID	127
Label	PMP-1
Notes	
Hyperlinks	<Collection: 0 items>
Downstream Pipe	134: P-3
<Geometry>	
X (m)	698,153.74
Y (m)	21,873.06
<Active Topology>	
Is Active?	True
<Initial Settings>	
Relative Speed Factor (Initial)	1.000
Status (Initial)	Off
<Operational>	
Controls	<Collection>
<Physical>	
Elevation (m)	148.00
Installation Year	0
Zone	<None>
Pump Definition	270: pompe 1
Is Variable Speed Pump?	False
<Pump Data>	
Head (Shutoff) (m)	40.00
Head (Design) (m)	30.00

Pump Definitions

Head | Efficiency | Motor | Transient | Library | Notes

Pump Definition Type: Design Point (1 Point)

	Flow (m³/d)	Head (m)
Shutoff:	0.00	40.00
Design:	7,600.00	30.00
Max. Operating:	15,200.00	0.00

lui

Head (m)

0.00 10.00 20.00 30.00 40.00

0.00 21,742.23

Pump Efficiency

100.0 80.0 60.0

Coefficients:

Y (m) 21,742.23

Active Topology

Is Active? True

Initial Settings

Relative Speed Factor (Initial) 1.000

Status (Initial) On

Operational

Controls <Collection>

Physical

Elevation (m) 148.00

Installation Year 0

Zone <None>

Pump Definition 274: pompe 2

Is Variable Speed Pump? False

Pump Data

Head (Shutoff) (m) 40.00

Head (Design) (m) 30.00

Flow (Design) (m³/d) 7,600.00

Head (Maximum Operating) (m) 0.00

Flow (Maximum Operating) (m³/d) 15,200.00

Flow (Maximum Extended) (m³/d) (N/A)

Transient (Operational)

Label

- Pump Definition - 1
- Pump Definition - 2 (PMP-1)
- Pump Definition - 3 (PMP-2)
- pompe 1
- pompe 2

X (m) 698,153.74

Y (m) 21,873.06

Active Topology

Is Active? True

Initial Settings

Relative Speed Factor (Initial) 1.000

Status (Initial) Off

Operational

Controls <Collection>

Physical

Elevation (m) 148.00

Installation Year 0

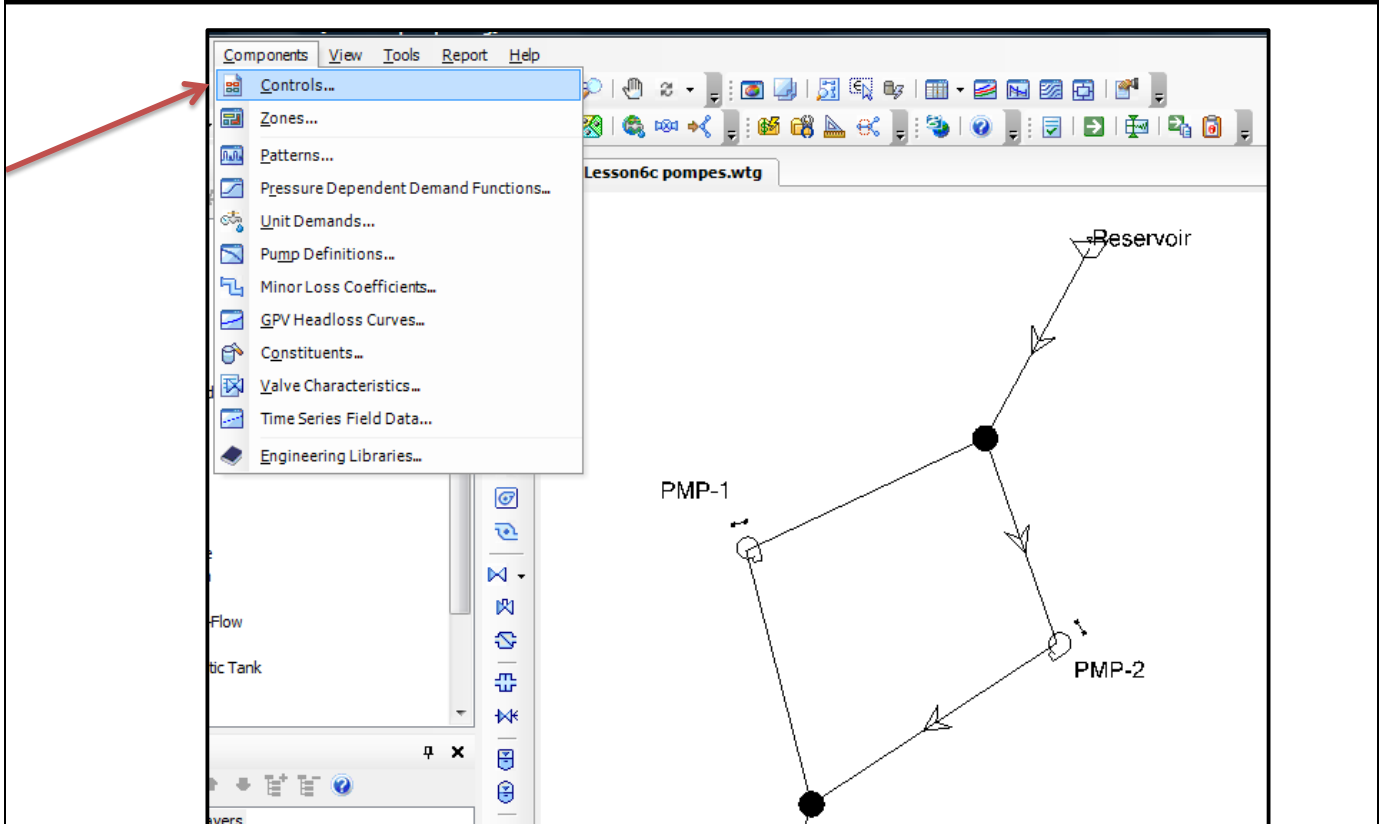
Zone <None>

PMP-2

CONTROLE DES POMPES

Chaque pompe marche 12 heures

Pompe 1 de 0h – 12h et pompe 2 de 12h – 24h



Controls (Lesson6c pompes.wtg)

Controls | Conditions | **Actions** | Control Sets

Control Set: <All> Condition Element: <All>
Type: <All> Action Element: <All>

ID	Type	Priority	Description
LC286	Logical	<default>	IF {"Time From Start" = 12.000 hours} THEN {"PMP-1" Pump Status = Off }
LC287	Logical	<default>	IF {"Time From Start" = 24.000 hours} THEN {"PMP-1" Pump Status = On }
LC288	Logical	<default>	IF {"Time From Start" = 0.000 hours} THEN {"PMP-2" Pump Status = Off }
LC289	Logical	<default>	IF {"Time From Start" = 12.000 hours} THEN {"PMP-2" Pump Status = On }
LC290	Logical	<default>	IF {"Time From Start" = 24.000 hours} THEN {"PMP-2" Pump Status = Off }

Evaluate as Simple Control Define Description?

IF Condition: {"Time From Start" = 24.000 hours} IF {"Time From Start" = 24.000 hours} THEN {"PMP-2" Pump

THEN Action: {"PMP-2" Pump Status = Off }

ELSE Action:

Priority: <default>

Summary:
IF {C281: "Time From Start" = 24.000 hours}
THEN {A284: "PMP-2" Pump Status = Off }

Close Help



Calculation Summary (32: Base)

Time (hours)	Balanced?	Trials	Relative Flow Change	Flow Supplied (gal)
All Time Steps...	True	69	0.0005141	2,565
00:00:00	True	6	0.0000760	1,903
01:00:00	True	2	0.0000681	1,882
02:00:00	True	2	0.0000656	1,861
03:00:00	True	3	0.0001314	1,847
04:00:00	True	2	0.0000805	1,824
05:00:00	True	2	0.0000785	1,802
06:00:00	True	4	0.0005141	1,800
07:00:00	True	2	0.0001535	1,833
08:00:00	True	2	0.0001334	1,864
09:00:00	True	5	0.0000263	1,938
10:00:00	True	3	0.0000158	2,006
11:00:00	True	3	0.0000136	2,069
11:46:18	True	6	0.0005040	3,834

Information | Status Messages | Trials

Time Step	Element ID	Message
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