ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

SITUACION: T.M. VILAVELLA (CASTELLON)

Marzo/2018

PETICIONARIO: AYUNTAMIENTO DE LA VILAVELLA (CASTELLÓN)

CONTENIDO: MEMORIA, ANEXOS Y PLANOS

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1.- ANTECEDENTES, OBJETO Y OBLIGATORIEDAD

El servicio de Urbanismo de la Dirección Territorial de Castellón remite el 16 de febrero de 2017, la documentación del Ayuntamiento de la Vilavella para el inicio del procedimiento de evaluación ambiental y territorial estratégica cuyo objeto es el Plan Especial de Reserva de Suelo Dotacional Asistencial Tanatorio de La Vilavella.

En verde: parcela inicial del cementerio
En azul: parcela nueva del cementerio con la ampliación
En amarillo: terreno perteneciente a Suelo Dotacional Deportivo
En discontinua roja: previsión de la ubicación del nuevo tanatorio, actualmente está como Suelo Dotacional Deportivo.

Con fecha de 11 de julio de 2017 se recibe informe del Servicio de Ordenación del Territorio de la Subdirección General de Ordenación del Territorio y Paisaje, relativo al riesgo de inundación en el que, consultada la cartografía de Patricova y de acuerdo a la normativa del mismo se considera que el Plan Especial no ha considerado las afecciones del PATRICOVA y en consecuencia no ha previsto medida alguna al respecto.

A la superficie objeto de ordenación urbanística le resulta de aplicación el DECRETO 201/2015, de 29 de octubre, del Consell, por el que se aprueba el Plan de acción territorial sobre prevención del riesgo de inundación en la Comunitat Valenciana. Concretamente las superficies presentan peligrosidad geomorfológica de acuerdo con el ***artículo 8.-Niveles de peligrosidad de inundación***.

Por lo tanto, le resultan de aplicación el siguiente artículo del PATRICOVA:

¨Artículo 20. Condicionantes en suelo urbano y suelo urbanizable con programa de actuación aprobado, afectado por peligrosidad de inundación Los Ayuntamientos, en el suelo urbano y en el suelo urbanizable con programa de actuación integrada aprobado, afectado por peligrosidad de inundación, deberán verificar la incidencia de la misma e imponer, cuando proceda, condiciones de adecuación de las futuras edificaciones, tomando como referencia las establecidas en el anexo I de esta normativa. Asimismo, impulsarán, junto con las restantes administraciones públicas implicadas, la realización de aquellas actuaciones de reducción del riesgo de inundación que sean más prioritaria. ¨

Es por este motivo expuesto, por lo que se redacta el presente estudio de inundabilidad de acuerdo con el contenido establecido en el artículo 12 del DECRETO 201/2015, de 29 de octubre, con el fin de determinar la incidencia del riesgo de inundación y establecer aquellas actuaciones para reducir el riesgo de inundación en aquellas zonas que sean prioritarias.

2.- DATOS DEL PROMOTOR Y EQUIPO PETICIONARIO

- **Datos del peticionario**

El peticionario del presente estudio es el Excmo. Ayuntamiento de la Vilavella (Castellón).

El presente documento se encarga a la consultoría IMGA, S.L., Ingeniería Minera, Geológica y Ambiental, domiciliada en la c/ Río Nalón 4, esc. 3, 2º X, de la localidad de Castellón

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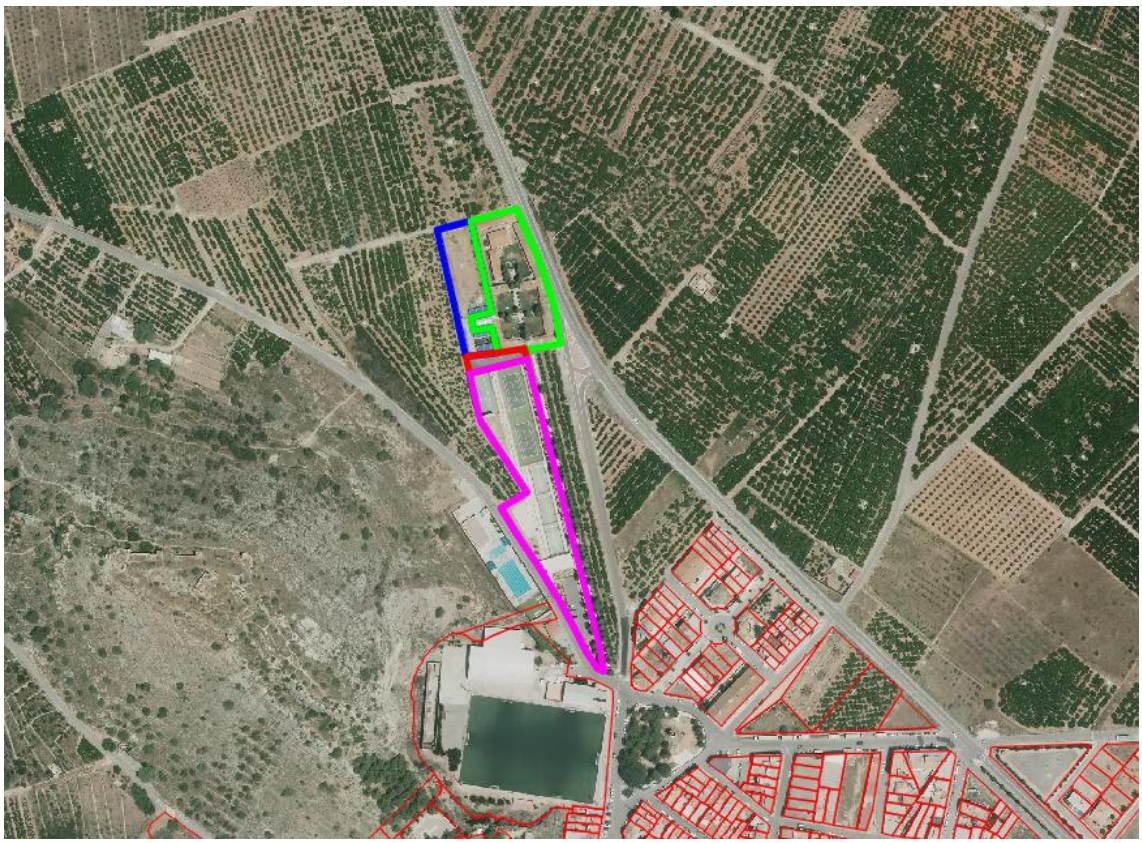
3.- SITUACIÓN Y DESCRIPCIÓN DE LA PARCELA

3.1.- Situación geográfica y descripción del entorno

De acuerco al **plano nº 1.-Situación**, **nº 2.-Emplazamiento** y **nº 3.-Ortocatastral**. La superficie de estudio se encuadra en las hojas cartográficas nº 640 y 641 de la Serie Cartográfica MNT-25 perteneciente al Instituto Geográfico Nacional.

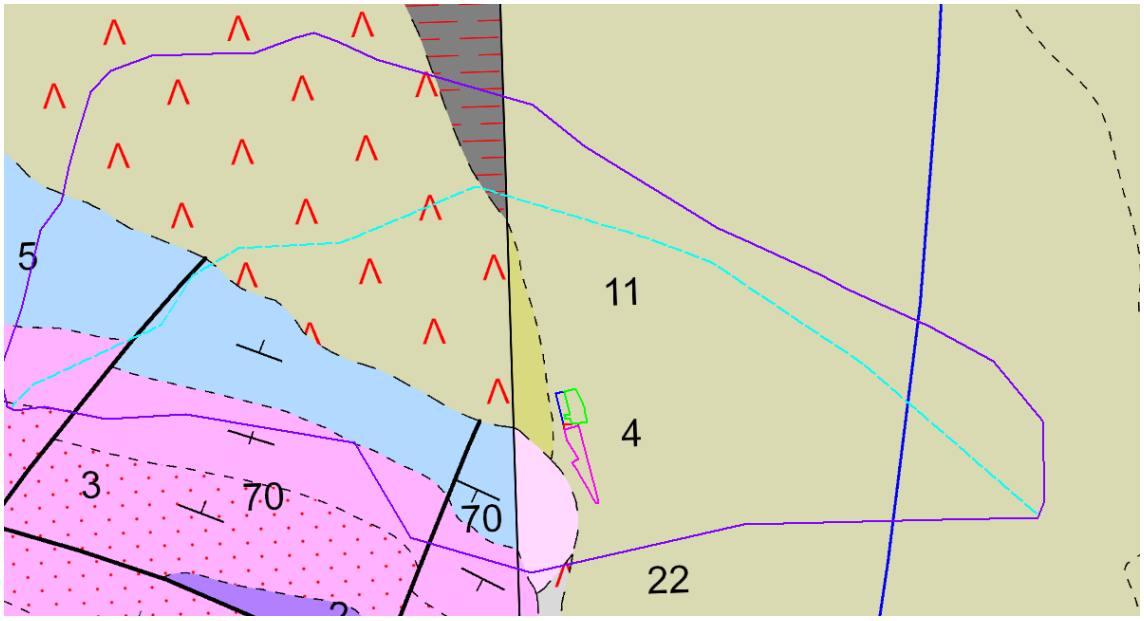
La zona de estudio se localiza al norte del casco urbano de la Vilavella y se encuentra limitada al oeste por superficie forestal y al este por superficie agrícola de cultivo de cítricos.



4.- CARACTERIZACIÓN PARÁMETROS HIDROLÓGICOS

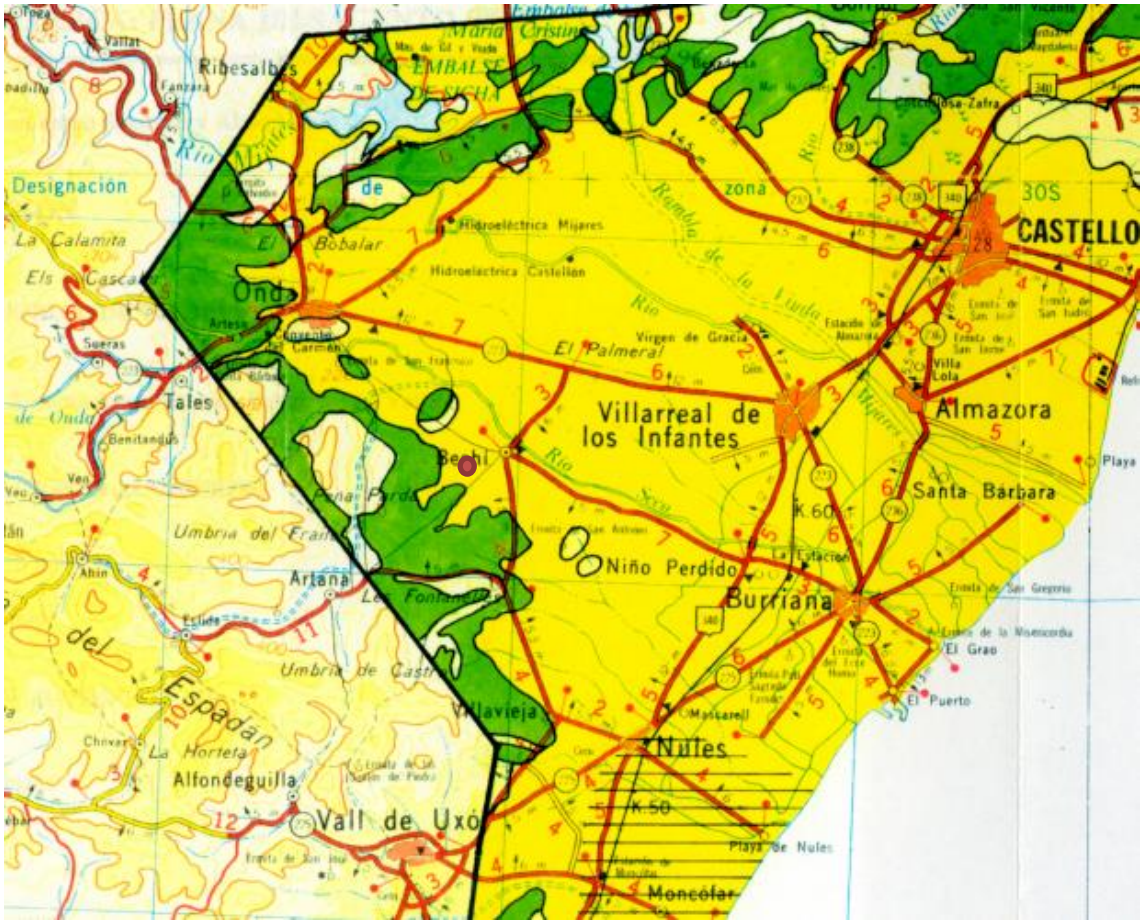
4.1.-Geología

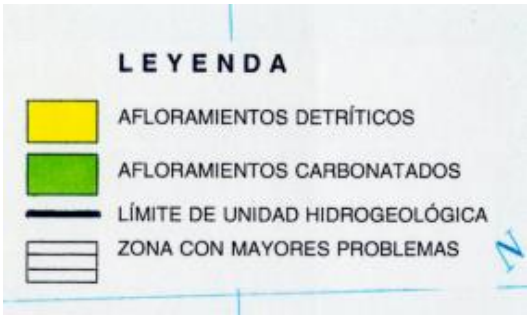
La geología de la zona de actuación y alrededores se ha caracterizado mediante el mapa geológico de España E. 1/50.000. Concretamente con la hoja 629 Castellón de la Plana. La geología se caracteriza por la presencia de **Mantos de Arroyada, Arcillas rojas y cantos con costras.**



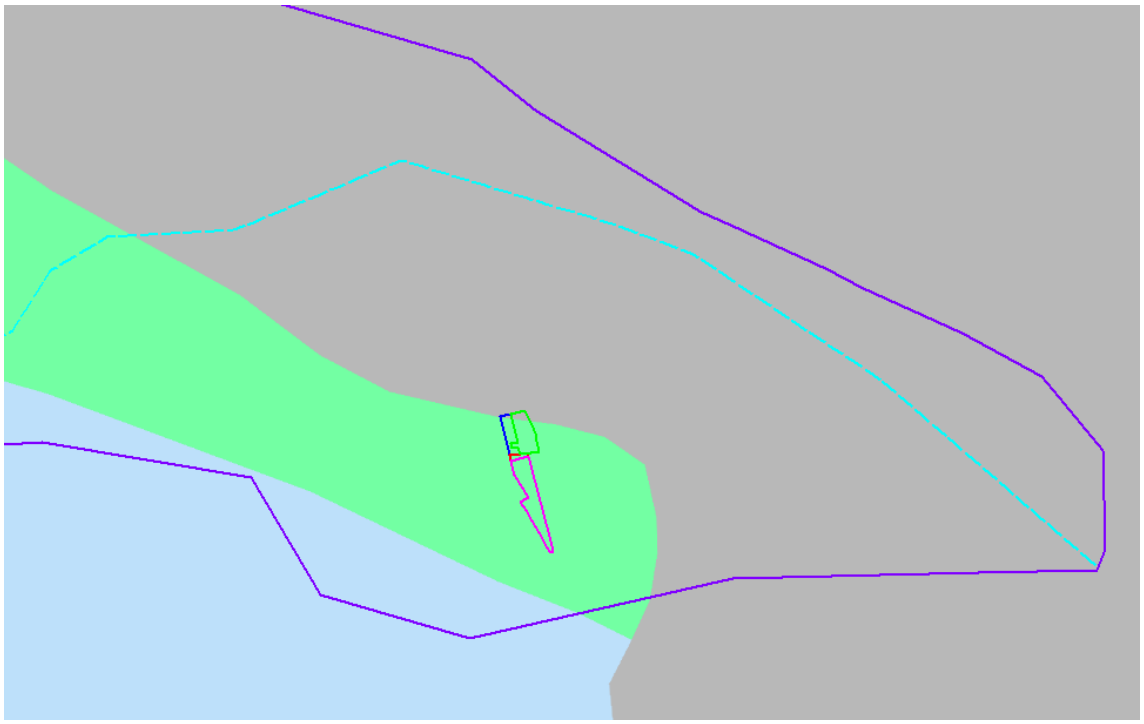
4.2.-Hidrogeología

El ambito de estudio se localiza en el acuifero de la Plana de Castellón, concretamente en la unidad hidrogeológica: Plana de Castellón (8.12). La litologia se caracterizan por una formación superior constituida por sedimentos pliocuaternarios, gravas, arenas y conglomerados. Este conjunto descansa sobre materiales mesozoicos de los sistemas adyacentes o sobre sedimentos terciarios de baja o media permeabilidad.


Ribesalbes
Designación
Onda
Tales
Artana
Alfondeguilla
Vall de Uxó
Villavieja
Villarreal de los Infantes
Almazora
Santa Barbara
Burriana
Niño Perdido
Nules
Moncofar
El Grao
El Puerto
CASTELLO
Hidroeléctrica Mijares
Hidroelectrica Castellón
El Palmeral
Virgen de Gracia
Playa de Nules
K 50
K 60


LEYENDA
AFLORAMIENTOS DETRÍTICOS
AFLORAMIENTOS CARBONATADOS
LÍMITE DE UNIDAD HIDROGEOLÓGICA
ZONA CON MAYORES PROBLEMAS
N

Consultada la capa de permeabilidad 1:200.00 disponible en el IGME, la permeabilidad resulta de la siguiente manera:



Las parcelas catastrales objeto de estudio presentan una permeabilidad media.

- C-M (Color verde)
- Carbonatadas Media

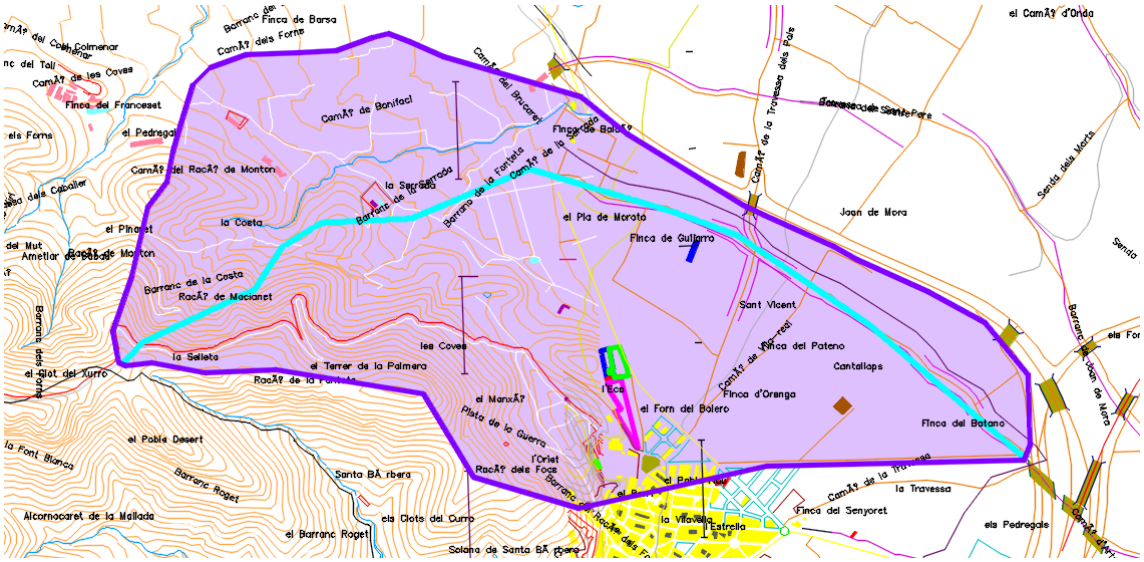
Aguas abajo la litologia presenta una permeabilidad media.

- Q-M (Color gris)
- Detríticas (Cuaternario-Media)

4.3.-Hidrología

La cuenca de drenaje de la zona de estudio la define el Barranco del Camino de Artana. La red de drenaje principal se encuentra se caracteriza por un canal en tierra aguas arriba, dispuesto paralelamente al camino, pasando incluso sin sección por el propio camino hasta desembocar en un canal de hormigón que desemboca finalmente en el barranco de la Serrateta.

La superficie de la cuenca es de 2,67 km^2. Su cauce principal es de 3330 m.L con una pendiente media del 5%.



La cuenca se limita al norte con la del barranco de Juan de Mora cuyas aguas son canalizadas por debajo de la A-7 y por el sur con la cuenca del barranco de la Font Freda que recoge las pluviales del casco urbano. Ver **plano nº 4.-Topográfico**

4.3.1.-Riesgo y peligro de inundación

Las inundaciones son fenómenos naturales no permanentes, durante los cuales las aguas ocupan temporalmente una parte del territorio. Los riesgos naturales constituyen en sí mismo factores limitantes a cualquier actividad antrópica en general, que en muchas ocasiones han sido obviados en la macro y micro planificación territorial, con consecuencias en ocasiones desastrosas para personas y bienes.

El presente epígrafe se basa en el Plan de Acción Territorial de Carácter Sectorial sobre prevención del Riesgo de Inundación en la Comunidad Valenciana (PATRICOVA).

Para medir el riesgo de inundación se estiman los parámetros frecuencia y magnitud. El primero de ellos mide la probabilidad de que en un año cualquiera el caudal que la produce se vea superado: habitualmente se habla de periodo de retorno. Por su parte se entiende como magnitud de la inundación aquel parámetro que depende de la cantidad de precipitación y de las características de la cuenca vertiente: básicamente tamaño y capacidad de infiltración. En el PATRICOVA se dividen en seis categorías los riesgos potenciales de inundación, que van de mayor a menor y son:

- **Riesgo 1**. Cuando la probabilidad de que en un año cualquiera se sufra, al menos, una inundación es superior a 0,04 (equivalente a un periodo de retorno inferior a 25 años), con un calado máximo generalizado alcanzado por el agua superior a ochenta centímetros (80 cm).

- **Riesgo 2**. Cuando la probabilidad de que en un año cualquiera se sufra, al menos, una inundación se encuentra entre 0,04 y 0,01 (equivalente a un periodo de retorno entre 25 y 100 años), con un calado máximo generalizado alcanzado por el agua superior a ochenta centímetros (80 cm).

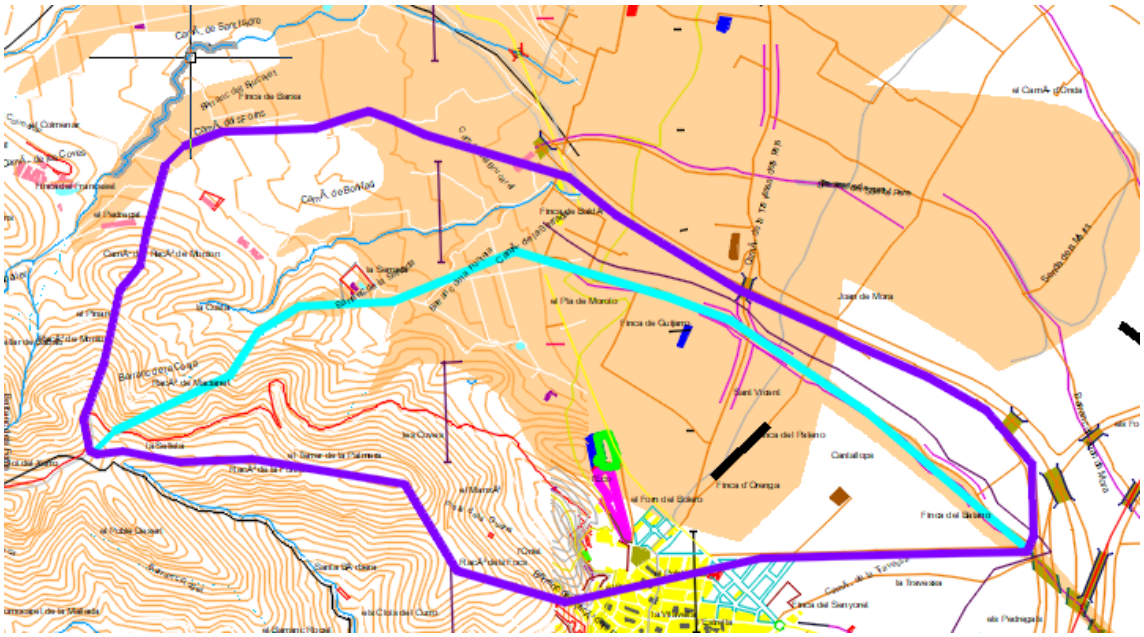
- **Riesgo 3**. Cuando la probabilidad de que en un año cualquiera se sufra, al menos, una inundación es superior a 0,04 (equivalente a un periodo de retorno inferior a 25 años), con un calado máximo generalizado alcanzado por el agua inferior a ochenta centímetros (80 cm).

- **Riesgo 4**. Cuando la probabilidad de que en un año cualquiera se sufra, al menos, una inundación se encuentra entre 0,04 y 0,01 (equivalente a un periodo de retorno entre 25 y 100 años), con un calado máximo generalizado alcanzado por el agua inferior a ochenta centímetros (80 cm).

- **Riesgo 5**. Cuando la probabilidad de que en un año cualquiera se sufra, al menos, una inundación se encuentra entre 0,01 y 0,002 (equivalente a un periodo de retorno entre 100 y 500 años), con un calado máximo generalizado alcanzado por el agua superior a ochenta centímetros (80 cm).

- **Riesgo 6**. Cuando la probabilidad de que en un año cualquiera se sufra, al menos, una inundación se encuentra entre 0,01 y 0,002 (equivalente a un periodo de retorno entre 100 y 500 años), con un calado máximo generalizado alcanzado por el agua inferior a ochenta centímetros (80 cm).

- **Peligrosidad geomorfológica**. Nivel en el que se incluyen diferentes procesos geomorfológicos que, por sus características, actúan como un indicador de la presencia de inundaciones históricas, aunque no estén catalogadas, debiéndose identificar la probabilidad de reactivación de estos procesos geomorfológicos, y en tal caso, los efectos que pudieran derivarse.



Según el Patricova las superficies de estudio presentan una peligrosidad geomorfológica. Ver plano nº 5.-PATRICOVA.

4.3.2.-Afección al Dominio Público

En cuanto a la afección del dominio público, el reglamento que desarrolla los títulos preliminares I, IV, VI y VII de la Ley 29/1985, de 2 de agosto, define los aspectos que a continuación se detallan:

- Art.2: “Constituyen el dominio público hidráulico del estado, con las salvedades expresamente establecidas por la Ley, los cauces de corriente naturales, continuos o discontinuos.”
- Art.4: Se define como cauce ”alveo o cauce natural de una corriente continua o discontinua es el terreno cubierto por las aguas en las máximas crecidas ordinarias”. Por su parte se considera como caudal de la máxima crecida ordinaria la media de los máximos caudales anuales, en su régimen natural, producidos durante diez años consecutivos, que sean representativos del comportamiento hidráulico de la corriente.

En el artículo 6, encontramos lo que se define por riberas, siendo éstas las fajas laterales de los cauces públicos situados por encima del nivel de las aguas bajas y por márgenes los terrenos que lindan con los cauces.

Los márgenes están sujetos a una zona de servidumbre de cinco metros de anchura para su uso público, así como a una zona de policía de cien metros de anchura en la que se condicionará el uso del suelo y las actividades que en él se desarrollen.

La parcela objeto de estudio se localiza fuera de la zona de policia del barranco objeto de estudio.

5.- CALCULO RIESGO DE INUNDABILIDAD ASOCIADO A LA PARCELA

La metodología de cálculo para la obtención del riesgo de inundación, así como de las zonas inundables en la zona de estudio está basada en el siguiente proceso con el orden que a continuación se describe:

1.- Recolección de datos meteorológicos de la zona de estudio y ajuste de una distribución de máximos a dichos datos con el fin de obtener la precipitación diaria máxima asociada a cada periodo de retorno.

2.- Modelización de la cuenca aportante al tramo en estudio y subdivisión en subcuencas con el fin de tener en cuenta las condiciones particulares de cada punto.

3.- Aplicación del método hidrometeorológico a la precipitación máxima diaria obtenida y a cada una de las cuencas y subcuencas modelizadas con el fin de obtener el caudal de referencia con el que se calculará el calado alcanzado en cada punto del cauce.

4.- Modelación del cauce. El proceso de modelación hidráulica se ha realizado empleando un software especializado, HEC-RAS 5.1, desarrollado por el Hidrologic Engineering Center (HEC) del U.S. Army Corps of Engineers. Mediante este sistema se estimarán las alturas de aguas, velocidades y demás parámetros hidráulicos de interés, en las diferentes secciones transversales.

5.- Representación gráfica en plano de las áreas de inundación calculadas para distintos periodos de retorno. En este caso, se establecen tres supuestos para el caso particular estudiado y que son:

- Riesgo de inundación: **Periodo de retorno T=25 años**
- Riesgo de inundación: **Periodo de retorno T=100 años**
- Riesgo de inundación: **Periodo de retorno T=500 años**

Mediante estos supuestos se determina finalmente el calado y riesgo de inundación asociado. A continuación, se pasa a describir los diferentes métodos utilizados en los cálculos descritos en el proceso anterior.

5.1.-Estudio de la cuenca de drenaje

La cartografía base utilizada 1:25.000 en el PATRICOVA no presenta líneas de drenaje superficial que en apariencia puedan desaguar los caudales recibidos. La modelización del drenaje superficial se hace a partir del LIDAR. A partir del modelo de elevaciones generado puede realizarse una adecuada modelización de la superficie de las cuencas de drenaje y sus subcuencas. La cuenca de drenaje a partir de la sección principal que pasa por las instalaciones objeto de estudio tiene una superficie de 2,67 km^2 y una pendiente del 5%. Ver **plano nº 4.-Topografia.**

5.2.-Calculo de la precipitación máxima

Los datos de precipitación máxima para la determinación del caudal de avenida para los diferentes periodos de retorno se han obtenido a partir del programa CAUMAX para los periodos de retorno de 25-100 y 500 años. **Las precipitaciones de estudio para los periodos de retorno de 25, 100 y 500 años son las siguientes:**

P.R	PMAX
25	173
100	217
500	320

5.3.-Calculo caudal recepción pluviales

El caudal se calcula conforme a la IT Orden FOM/298/2016, de 15 de febrero, por la que se aprueba la **norma 5.2 - IC drenaje superficial de la Instrucción de Carreteras**.

El caudal se calcula conforme al caudal máximo anual **Qt,** correspondiente a un periodo de retorno **T**, se calcula mediante la fórmula:

$$Q_T = \frac{I(T,t_c) \cdot C \cdot A \cdot K_t}{3{,}6}$$

- QT (m^3 /s). Caudal máximo anual correspondiente al período de retorno T, en el punto de desagüe de la cuenca.
- I (T, tc) (mm/h). Intensidad de precipitación correspondiente al período de retorno considerado T, para una duración del aguacero igual al tiempo de concentración tc, de la cuenca.
- C (adimensional). Coeficiente medio de escorrentía de la cuenca o superficie considerada.
- A (km^2) Área de la cuenca o superficie considerada.
- Kt (adimensional). Coeficiente de uniformidad en la distribución temporal de la precipitación.

5.3.1.-Intensidad de precipitación

- **Consideraciones generales**

$$I(T,t) = I_d \cdot F_{\text{int}}$$

- **I (T, t) (mm/h). Intensidad de precipitación correspondiente a un período de retorno T y a una duración del aguacero t.**
- **Id (mm/h). Intensidad media diaria de precipitación corregida correspondiente al período de retorno T**
- **Fint (adimensional). Factor de intensidad**

- **Intensidad media diaria de precipitación corregida**

$$I_d = \frac{P_d \cdot K_A}{24}$$

- **Id (mm/h). Intensidad media diaria de precipitación corregida correspondiente al período de retorno.**
- **T Pd (mm). Precipitación diaria correspondiente al período de retorno.**
- **T KA (adimensional). Factor reductor de la precipitación por área de la cuenca.**

- **Factor reductor de la precipitación por área de la cuenca**

Si $A < 1$ km^2	$K_A = 1$
Si $A \geq 1$ km^2	$K_A = 1 - \frac{\log_{10} A}{15}$

  - **KA (adimensional) Factor reductor de la precipitación por área de la cuenca**
  - **A (km^2) Área de la cuenca (epígrafe 2.2.4).**

- **Factor de intensidad F_{int}**

Se tomará el mayor valor de los obtenidos de entre los que se indican a continuación:

$$F_{int} = máx\ (F_a, F_b)$$

  - **Fint (adimensional) Factor de intensidad**
  - **Fa (adimensional) Factor obtenido a partir del índice de torrencialidad (I1/Id)**
  - **Fb (adimensional) Factor obtenido a partir de las curvas IDF de un fluviógrafo próximo.**

- **Obtención de F_a**

$$F_a = \left(\frac{I_1}{I_d}\right)^{3{,}5287 - 2{,}5287\, t^{0{,}1}}$$

  - **Fa (adimensional). Factor obtenido a partir del índice de torrencialidad.**
  - **(I1/Id). Se representa en la figura 2.3.**
  - **I1/Id (adimensional). Índice de torrencialidad que expresa la relación entre la intensidad de precipitación horaria y la media diaria corregida. Su valor se determina en función de la zona geográfica, a partir del mapa de la figura 2.4.**
  - **t (horas). Duración del aguacero.**

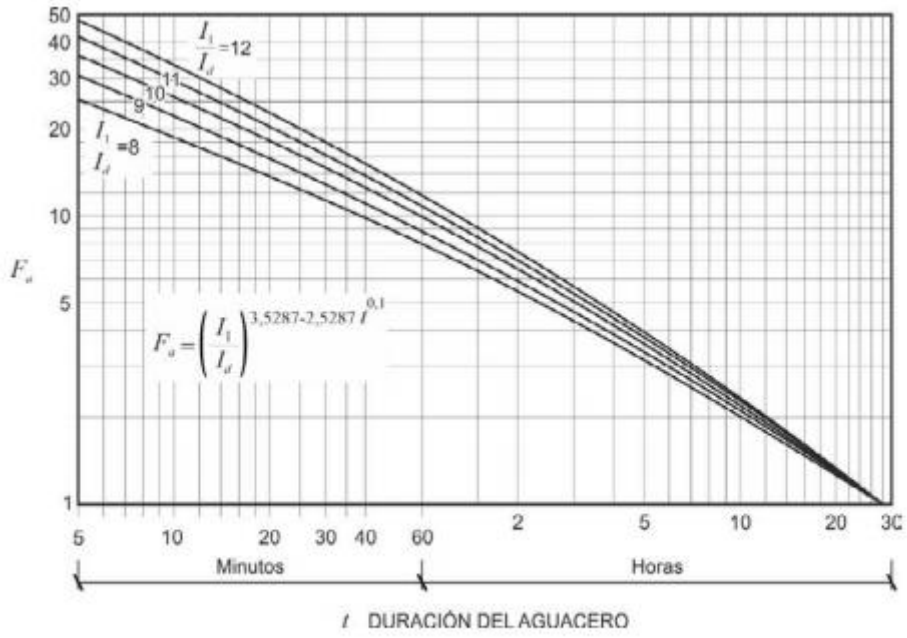


FIGURA 2.3.- FACTOR F_a

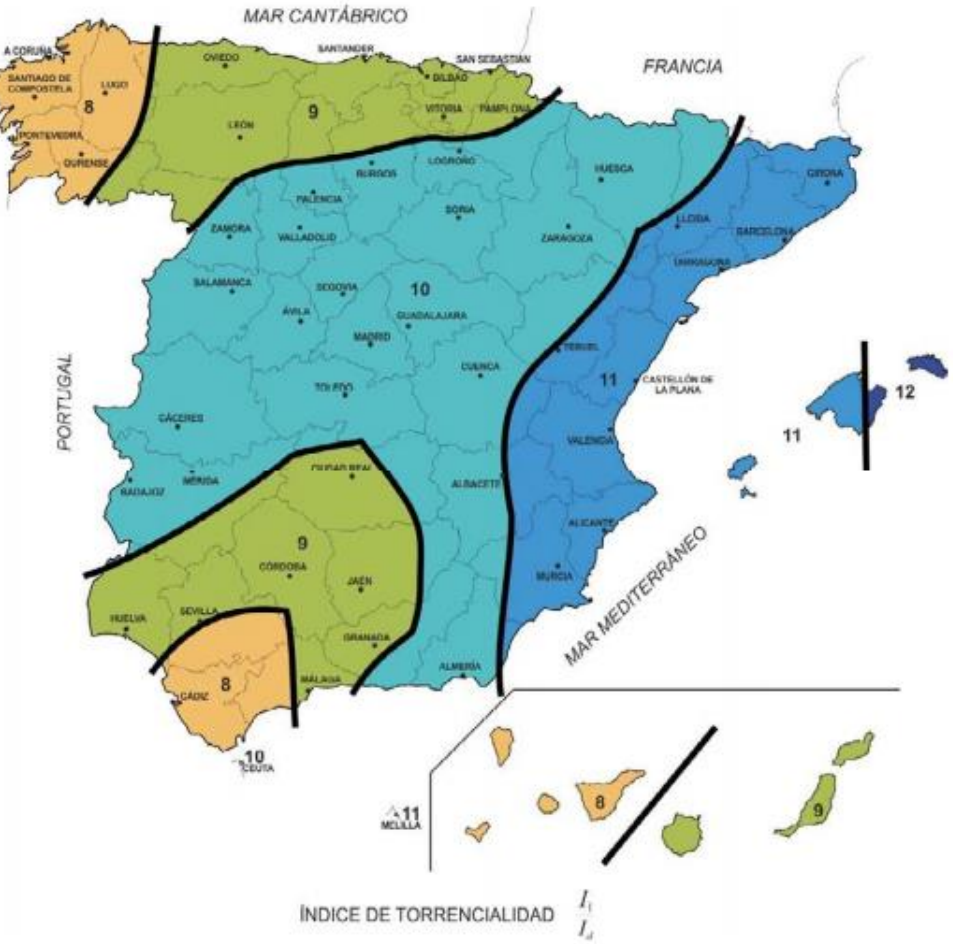


FIGURA 2.4.- MAPA DEL ÍNDICE DE TORRENCIALIDAD (I_1/I_d)

- **Obtención de F_b**

$$F_b = k_b \frac{I_{IDF}(T,t_c)}{I_{IDF}(T,24)}$$

- Fb (adimensional) Factor obtenido a partir de las curvas IDF de un fluviógrafo próximo.
- IIDF (T,tc) (mm/h) Intensidad de precipitación correspondiente al período de retorno T y al tiempo de concentración tc, obtenido a través de las curvas IDF del fluviógrafo (figura 2.5).
- IIDF (T,24) (mm/h) Intensidad de precipitación correspondiente al período de retorno T y a un tiempo de aguacero igual a veinticuatro horas (t=24h), obtenido a través de curvas IDF (figura 2.5).
- kb (adimensional) Factor que tiene en cuenta la relación entre la intensidad máxima anual en un período de veinticuatro horas y la intensidad máxima anual diaria. En defecto de un cálculo específico se puede tomar kb

- **Tiempo de concentración**

Para cuencas principales

$$t_c = 0{,}3 \cdot L_c^{\,0{,}76} \cdot J_c^{\,-0{,}19}$$

- **tc (horas) Tiempo de concentración**
- **Lc (km) Longitud del cauce**
- **Jc (adimensional) Pendiente media del cauce**

Para cuencas secundarias

$$t_{dif} = 2 \cdot L_{dif}^{\,0{,}408} \cdot n_{dif}^{\,0{,}312} \cdot J_{dif}^{\,-0{,}209}$$

- **tdif (minutos) Tiempo de recorrido en flujo difuso sobre el terreno.**
- **ndif (adimensional) Coeficiente de flujo difuso (tabla 2.1).**
- **Ldif (m) Longitud de recorrido en flujo difuso**
- **Jdif (adimensional) Pendiente media**

TABLA 2.1.- VALORES DEL COEFICIENTE DE FLUJO DIFUSO n_{dif}

Cobertura del terreno		n_{dif}
Pavimentado o revestido		0,015
No pavimentado ni revestido	Sin vegetación	0,050
	Con vegetación escasa	0,120
	Con vegetación media	0,320
	Con vegetación densa	1,000

El valor del tiempo de concentración se obtiene a partir de la siguiente tabla:

TABLA 2.2.- DETERMINACIÓN DE t_c EN CONDICIONES DE FLUJO DIFUSO

t_{dif} (minutos)	t_C (minutos)
≤ 5	5
$5 \leq t_{dif} \leq 40$	t_{dif}
≥ 40	40

5.3.2.-Coeficiente de escorrentia

Si $P_d \cdot K_A > P_0$

$$C = \frac{\left(\frac{P_d \cdot K_A}{P_0} - 1\right)\left(\frac{P_d \cdot K_A}{P_0} + 23\right)}{\left(\frac{P_d \cdot K_A}{P_0} + 11\right)^2}$$

Si $P_d \cdot K_A \leq P_0$

$$C = 0$$

- **C (adimensional) Coeficiente de escorrentía.**
- **Pd (mm) Precipitación diaria correspondiente al período de retorno T considerado.**
- **KA (adimensional) Factor reductor de la precipitación por área de la cuenca**
- **P0 (mm) Umbral de escorrentía.**

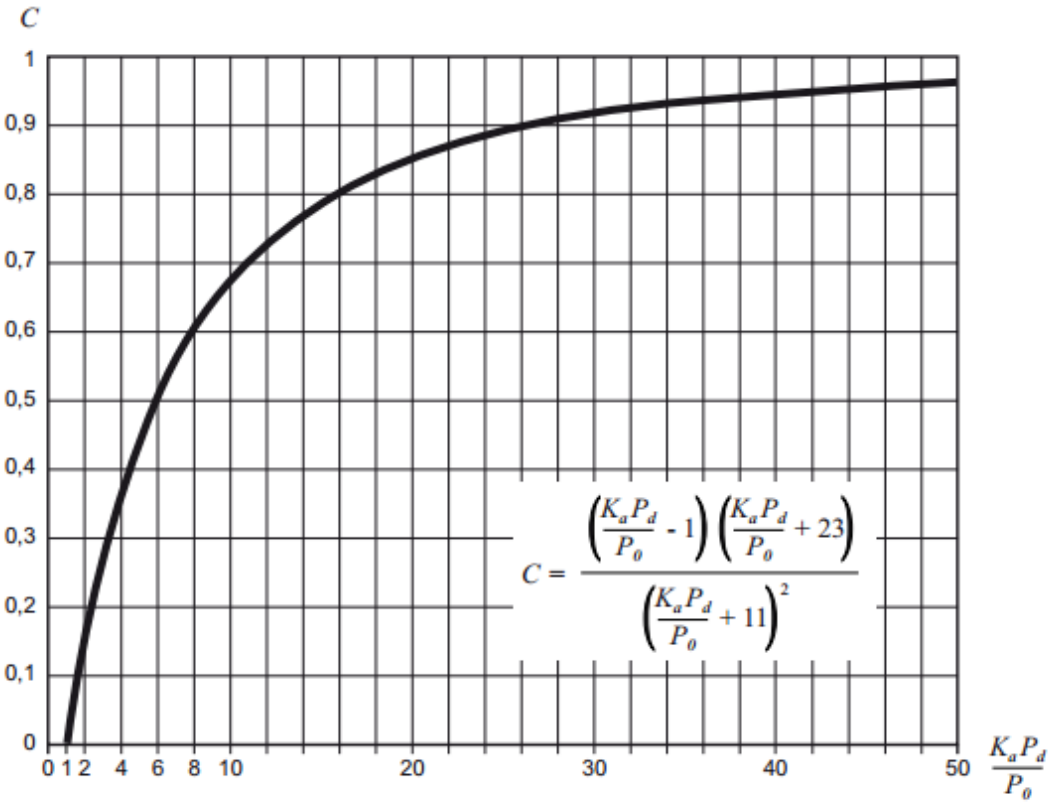


FIGURA 2.6.- DETERMINACIÓN DEL COEFICIENTE DE ESCORRENTÍA

- **Umbral de escorrentia P0**

$$P_0 = P_0^i \cdot \beta$$

- **P0 (mm) Umbral de escorrentía**
- **P0 i (mm) Valor inicial del umbral de escorrentía.**
- **E (adimensional) Coeficiente corrector del umbral de escorrentía.**

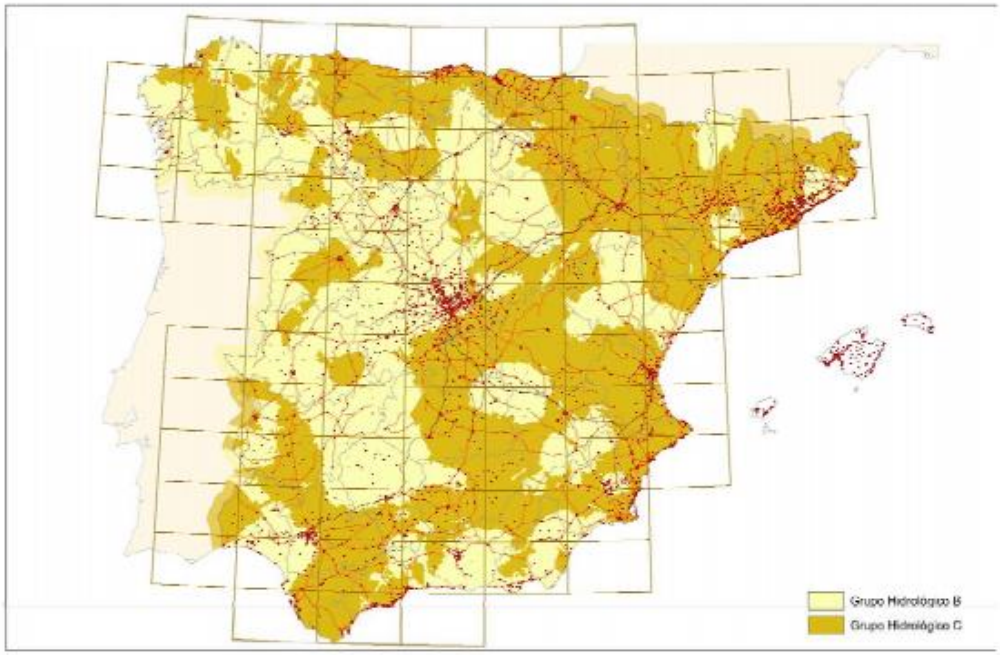


FIGURA 2.7.- MAPA DE GRUPOS HIDROLÓGICOS DE SUELO

TABLA 2.4.- GRUPOS HIDROLÓGICOS DE SUELO A EFECTOS DE LA DETERMINACIÓN DEL VALOR INICIAL DEL UMBRAL DE ESCORRENTÍA

Grupo	Infiltración (cuando están muy húmedos)	Potencia	Textura	Drenaje
A	Rápida	Grande	Arenosa Areno-limosa	Perfecto
B	Moderada	Media a grande	Franco-arenosa Franca Franco-arcillosa-arenosa Franco-limosa	Bueno a moderado
C	Lenta	Media a pequeña	Franco-arcillosa Franco-arcillo-limosa Arcillo-arenosa	Imperfecto
D	Muy lenta	Pequeño (litosuelo) u horizontes de arcilla	Arcillosa	Pobre o muy pobre

Nota: Los terrenos con nivel freático alto se incluirán en el Grupo D.

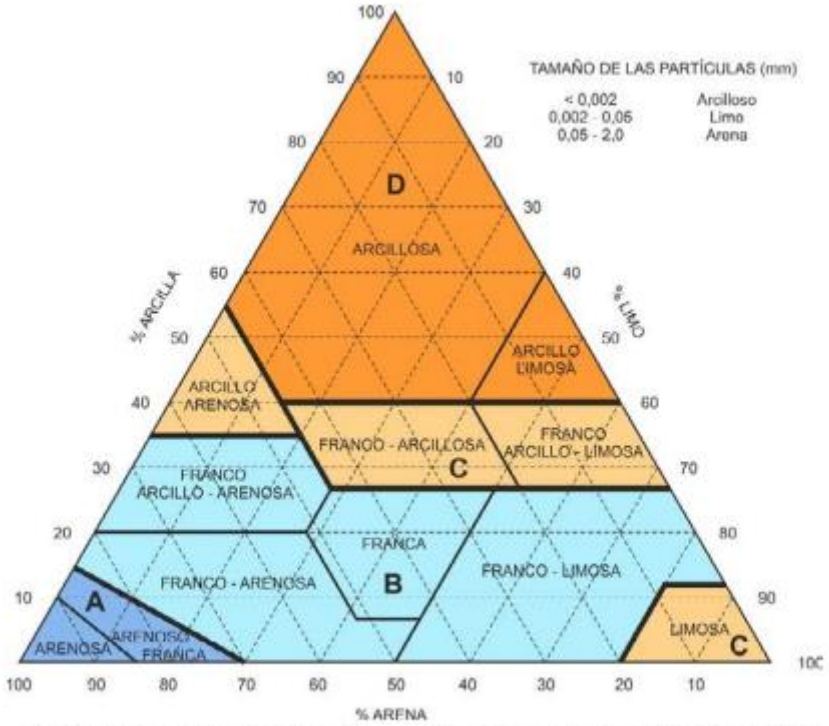


FIGURA 2.8.- DIAGRAMA TRIANGULAR PARA DETERMINACIÓN DE LA TEXTURA EN MATERIALES TIPO SUELO

- **Valor inicial de escorrentia P0i**

TABLA 2.3.- VALOR INICIAL DEL UMBRAL DE ESCORRENTÍA P_0^i (mm)

Código	Uso de suelo	Práctica de cultivo	Pendiente (%)	Grupo de suelo			
				A	B	C	D
11100	Tejido urbano continuo			1	1	1	1
11200	Tejido urbano discontinuo			24	14	8	6
11200	Urbanizaciones			24	14	8	6
11210	Estructura urbana abierta			24	14	8	6
11220	Urbanizaciones exentas y/o ajardinadas			24	14	8	6
12100	Zonas industriales y comerciales			6	4	3	3
12100	Granjas agrícolas			24	14	8	6
12110	Zonas industriales			12	7	5	4
12120	Grandes superficies de equipamiento y servicios			6	4	3	3
12200	Redes viarias, ferroviarias y terrenos asociados			1	1	1	1
12210	Autopistas, autovías y terrenos asociados			1	1	1	1
12220	Complejos ferroviarios			12	7	5	4
12300	Zonas portuarias			1	1	1	1
12400	Aeropuertos			24	14	8	6
13100	Zonas de extracción minera			16	9	6	5
13200	Escombreras y vertederos			20	11	8	6
13300	Zonas de construcción			24	14	8	6
14100	Zonas verdes urbanas			53	23	14	10
14200	Instalaciones deportivas y recreativas			79	32	18	13
14210	Campos de golf			79	32	18	13
14220	Resto de instalaciones deportivas y recreativas			53	23	14	10
21100	Tierras de labor en secano (cereales)	R	≥ 3	29	17	10	8
21100	Tierras de labor en secano (cereales)	N	≥ 3	32	19	12	10
21100	Tierras de labor en secano (cereales)	R/N	< 3	34	21	14	12
21100	Tierras de labor en secano (viveros)			0	0	0	0
21100	Tierras de labor en secano (hortalizas)	R	≥ 3	23	13	8	6
21100	Tierras de labor en secano (hortalizas)	N	≥ 3	25	16	11	8
21100	Tierras de labor en secano (hortalizas)	R/N	< 3	29	19	14	11
21100	Tierras abandonadas		≥ 3	16	10	7	5
21100	Tierras abandonadas		< 3	20	14	11	8
21200	Terrenos regados permanentemente	R	≥ 3	37	20	12	9
21200	Terrenos regados permanentemente	N	≥ 3	42	23	14	11
21200	Terrenos regados permanentemente	R/N	< 3	47	25	16	13
21210	Cultivos herbáceos en regadío	R	≥ 3	37	20	12	9
21210	Cultivos herbáceos en regadío	N	≥ 3	42	23	14	11
21210	Cultivos herbáceos en regadío	R/N	< 3	47	25	16	13
21220	Otras zonas de irrigación			0	0	0	0
21300	Arrozales			47	25	16	13
22100	Viñedos		≥ 3	62	28	15	10
22100	Viñedos		< 3	75	34	19	14
22110	Viñedos en secano		≥ 3	62	28	15	10

$$\beta^{PM} = \beta_m \cdot F_T$$

- **B PM (adimensional) Coeficiente corrector del umbral de escorrentía para drenaje de plataforma y márgenes, o drenaje transversal de vías auxiliares**
- **Bm (adimensional) Valor medio en la región, del coeficiente corrector del umbral de escorrentía (tabla 2.5)**
- **FT (adimensional) Factor función del período de retorno T (tabla 2.5)**

FIGURA 2.9.- REGIONES CONSIDERADAS PARA LA CARACTERIZACIÓN DEL COEFICIENTE CORRECTOR DEL UMBRAL DE ESCORRENTÍA

TABLA 2.5.- COEFICIENTE CORRECTOR DEL UMBRAL DE ESCORRENTÍA: VALORES CORRESPONDIENTES A CALIBRACIONES REGIONALES

Región	Valor medio, β_m	Desviación respecto al valor medio para el intervalo de confianza del			Período de retorno T (años), F_T				
		50% Δ_{50}	67% Δ_{67}	90% Δ_{90}	2	5	25	100	500
11	0,90	0,20	0,30	0,50	0,80	0,90	1,13	1,34	1,59
12	0,95	0,20	0,25	0,45	0,75	0,90	1,14	1,33	1,56
13	0,60	0,15	0,25	0,40	0,74	0,90	1,15	1,34	1,55
21	1,20	0,20	0,35	0,55	0,74	0,88	1,18	1,47	1,90
22	1,50	0,15	0,20	0,35	0,74	0,90	1,12	1,27	1,37
23	0,70	0,20	0,35	0,55	0,77	0,89	1,15	1,44	1,82
24	1,10	0,15	0,20	0,35	0,76	0,90	1,14	1,36	1,63
25	0,60	0,15	0,20	0,35	0,82	0,92	1,12	1,29	1,48
31	0,90	0,20	0,30	0,50	0,87	0,93	1,10	1,26	1,45
32	1,00	0,20	0,30	0,50	0,82	0,91	1,12	1,31	1,54
33	2,15	0,25	0,40	0,65	0,70	0,88	1,15	1,38	1,62
41	1,20	0,20	0,25	0,45	0,91	0,96	1,00	1,00	1,00
42	2,25	0,20	0,35	0,55	0,67	0,86	1,18	1,46	1,78
511	2,15	0,10	0,15	0,20	0,81	0,91	1,12	1,30	1,50
512	0,70	0,20	0,30	0,50	1,00	1,00	1,00	1,00	1,00
52	0,95	0,20	0,25	0,45	0,89	0,94	1,09	1,22	1,36
53	2,10	0,25	0,35	0,60	0,68	0,87	1,16	1,38	1,56
61	2,00	0,25	0,35	0,60	0,77	0,91	1,10	1,18	1,17
71	1,20	0,15	0,20	0,35	0,82	0,94	1,00	1,00	1,00
72	2,10	0,30	0,45	0,70	0,67	0,86	1,00	-	-
81	1,30	0,25	0,35	0,60	0,76	0,90	1,14	1,34	1,58
821	1,30	0,35	0,50	0,85	0,82	0,91	1,07	-	-
822	2,40	0,25	0,35	0,60	0,70	0,86	1,16	-	-
83	2,30	0,15	0,25	0,40	0,63	0,85	1,21	1,51	1,85
91	0,85	0,15	0,25	0,40	0,72	0,88	1,19	1,52	1,95
92	1,45	0,30	0,40	0,70	0,82	0,94	1,00	1,00	1,00
93	1,70	0,20	0,25	0,45	0,77	0,92	1,00	1,00	1,00
941	1,80	0,15	0,20	0,35	0,68	0,87	1,17	1,39	1,64
942	1,20	0,15	0,25	0,40	0,77	0,91	1,11	1,24	1,32
951	1,70	0,30	0,40	0,70	0,72	0,88	1,17	1,43	1,78
952	0,85	0,15	0,25	0,40	0,77	0,90	1,13	1,32	1,54
101	1,75	0,30	0,40	0,70	0,76	0,90	1,12	1,27	1,39
1021	1,45	0,15	0,25	0,40	0,79	0,93	1,00	1,00	1,00
1022	2,05	0,15	0,25	0,40	0,79	0,93	1,00	1,00	1,00

En Ceuta y Melilla se adoptarán valores similares a los de la región 61.
Pueden obtenerse valores intermedios por interpolación adecuada a partir de los datos de esta tabla
En todos los casos F_{10}=1,00

5.3.3.-Área de la cuenca

$$Q_T = \frac{K_t}{3{,}6} \cdot \sum_i \left[I(T, t_c)_i \cdot C_i \cdot A_i \right]$$

5.3.4.-Coeficiente uniformidad distribución temporal de la precipitación

$$K_t = 1 + \frac{t_c^{1,25}}{t_c^{1,25} + 14}$$

.

- **Kt (adimensional) Coeficiente de uniformidad en la distribución temporal de la precipitación.**
- **tc (horas) Tiempo de concentración de la cuenca**

5.3.5.-Datos de partida

- Superficie de la cuenca= 2,67 km^2
- Longitud cauce principal= 3,33 km
- Pendiente del cauce principal= 0,05

5.3.6.-Resultados

$$Q_T = \frac{I(T,t_c) \cdot C \cdot A \cdot K_t}{3{,}6}$$

- **QT (m^3 /s). Caudal máximo anual correspondiente al período de retorno T, en el punto de desagüe de la cuenca.**
- **I (T, tc) (mm/h). Intensidad de precipitación correspondiente al período de retorno considerado T, para una duración del aguacero igual al tiempo de concentración tc, de la cuenca.**
- **C (adimensional). Coeficiente medio de escorrentía de la cuenca o superficie considerada.**
- **A (km^2) Área de la cuenca o superficie considerada.**
- **Kt (adimensional). Coeficiente de uniformidad en la distribución temporal de la precipitación.**

5.3.6.1.- Barranco del Camino de Artana

- **Dimensionamiento caudal PR=25**

DIMENSIONAMIENTO CAUDAL PR =25	
Qt (m^3/sg)	7.7831
I (T, Tc) (mm/h)	83.5408
C	0.1188
A (km^2)	2.670000
KT	1.0574

- **Dimensionamiento caudal PR=100**

DIMENSIONAMIENTO CAUDAL PR =100	
Qt (m^3/sg)	14.4810
I (T, Tc) (mm/h)	104.3419
C	0.1770
A (km^2)	2.670000
KT	1.0574

- **Dimensionamiento caudal PR=500**

DIMENSIONAMIENTO CAUDAL PR =500	
Qt (m^3/sg)	35.5115
I (T, Tc) (mm/h)	153.8683
C	0.2943
A (km^2)	2.670000
KT	1.0574

5.4.-Modelización hidráulica

En el presente estudio se ha elaborado un cálculo de caudales para los periodos de retorno de 50, 100 y 500 años a través de un método hidrometeorológico, tal y como se expone anteriormente.

Una vez conocidos los caudales máximos de referencia, se procede a la modelación hidráulica de la zona de estudio.

El objetivo de la modelación hidráulica es convertir los caudales de la modelación hidrometeorológica anteriormente obtenidos, en límites y calados de la zona de inundación. Dado el alcance y precisión de este trabajo, la obtención de la lámina de agua se ha realizado con la hipótesis de flujo uniforme, es decir, la pendiente de la línea de energía se aproxima por la pendiente del lecho del cauce.

El proceso de modelación hidráulica se ha realizado empleando un software especializado, HEC-RAS 5.1, desarrollado por el Hidrologic Engineering Center (HEC) del U.S. Army Corps of Engineers. Este sistema de análisis (River Analysis System, RAS) resuelve el cálculo del eje hidráulico utilizando un modelo numérico de flujo unidimensional para estimar las alturas de aguas, velocidades y demás parámetros hidráulicos de interés, en las diferentes secciones transversales.

Como datos de entrada para la modelación, HEC-RAS requiere datos geométricos y condiciones del flujo:

- A. Datos geométricos. La elaboración de los datos geométricos se desarrolló con una aplicación de HEC-RAS, denominada HEC-GeoRas. Para el modelo tridimensional, se emplea el modelo tridimensional LIDAR 1m de Betxi, perteneciente al Instituto cartográfico valenciano. Una cartografía muy precisa que refleja fielmente la topografía de la zona de estudio.
- B. Datos de flujo.

En este apartado se ingresan los caudales de crecidas y la condición de borde para la resolución del eje hidráulico.

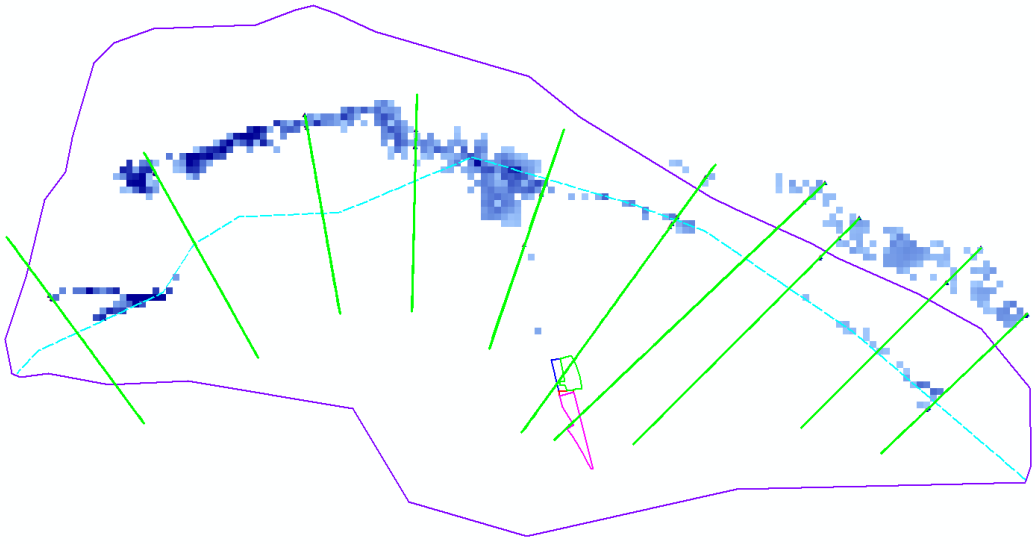
Los caudales para los periodos de retorno estudiados son los siguientes:

- **Caudal barranco del Camino de Artana**

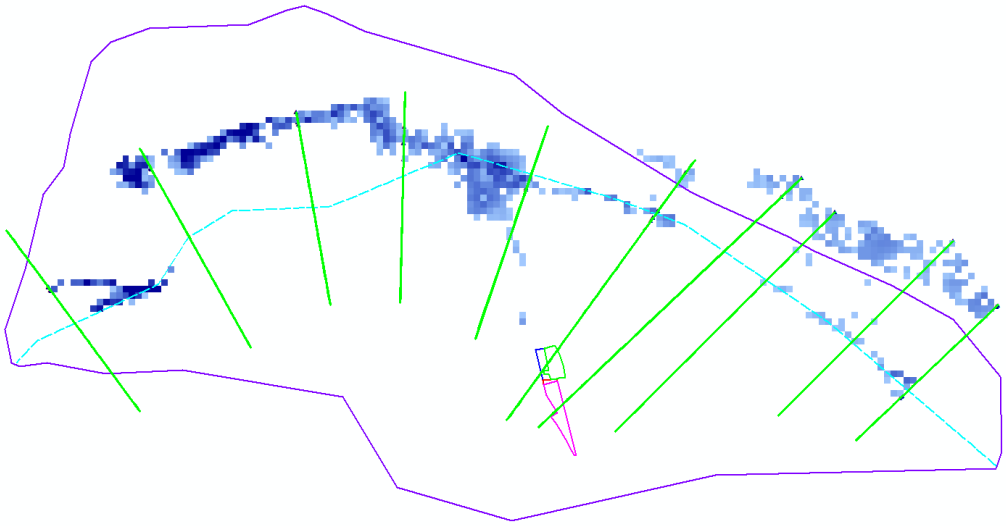
1) QPR25= 7,78 m^3/s
2) QPR100 = 14,48 m^3/s
3) QPR500 = 35,51 m^3/s

5.4.1.-Determinación de la Inundabilidad

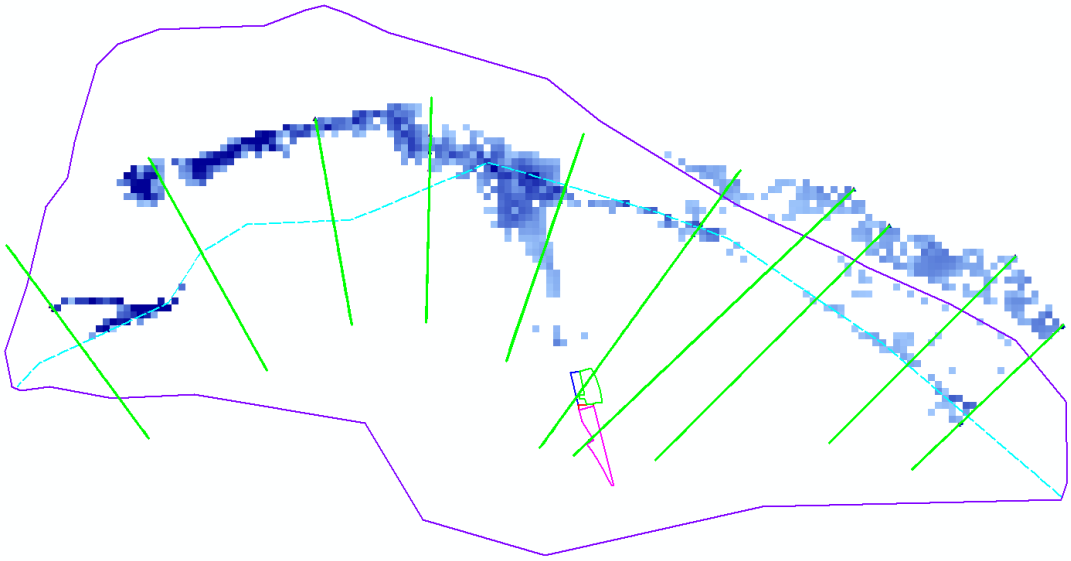
En este apartado se determina la altura de la lámina de agua que se alcanza para los caudales de avenida según los distintos periodos de retorno (50, 100 y 500 años). Se realiza un análisis para comparar la inundabilidad de la zona a través de una modelación hidráulica de detalle y la que muestra el PATRICOVA. Los datos obtenidos se pueden apreciar en el plano nº 7, donde aparece representado el calado para un periodo de retorno de 500, considerando este como el caso más desfavorable a estudiar.



CALADO PR=25 AÑOS



CALADO= PR 100 AÑOS



CALADO 500 AÑOS

5.5.-Resultados

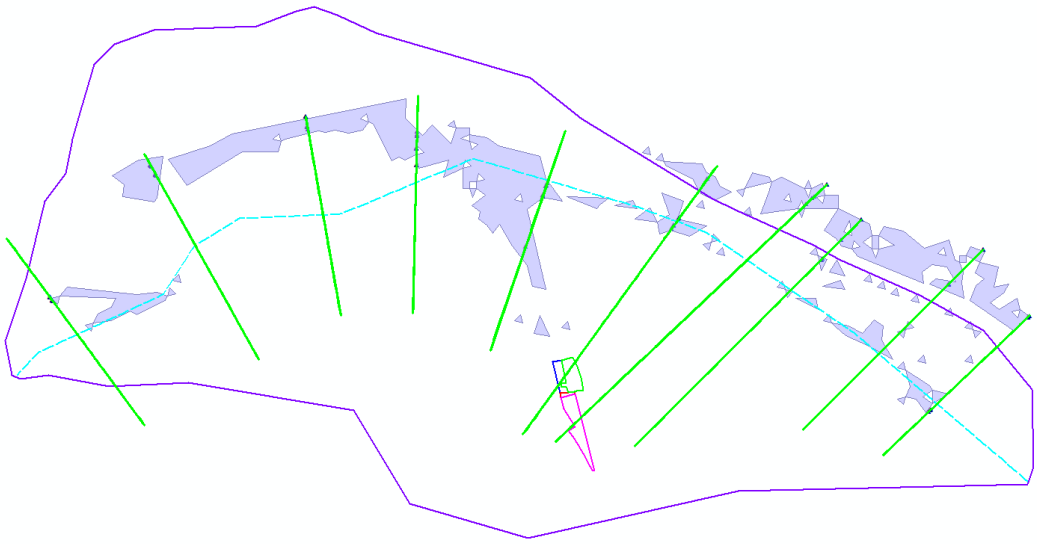
5.5.1.-Barranco del Camino de Artana

Como se observa en el anexo nº 1, 2 y en el documento nº 2.-Planos, se obtienen las siguientes conclusiones para el análisis de la inundabilidad del barranco del Camino de Artana:

- En las primeras secciones se observa que la línea de flujo que se había definido en la modelización del PATRICOVA no es del todo exacta, esto se debe a que la topografía utilizada en el presente estudio es mucho más precisa y próxima a la realidad actual, ya que el PATRICOVA emplea topografía y modelos tridimensionales de menor precisión dada la superficie tan amplia de estudio.

- La superficie objeto de estudio por el riesgo de inundación geomorfológico no le llega la lámina de agua para un periodo de retorno de 500 años. El barranco presenta una sección suficiente para evacuar una precipitación para un periodo de retorno de 500 años sin que sobrepase la sección del barranco.

- La sección del barranco tiene la sección suficiente para un caudal de 35,35 m^3/s, correspondiente al periodo de retorno de 500 años sin que afecte a la superficie objeto de estudio.



6.- CONCLUSIONES

Finaliza aquí el presente estudio de inundabilidad en el cual se concluye que la superficie objeto de estudio no presenta riesgo geomorfológico. Se firma para que conste a efectos oportunos el equipo redactor en Castellón a marzo de 2018:

El equipo redactor

Fdo.: Andrés Sáez Vizcaíno
Ingeniero de Grado en Recursos Minerales y Energía
Colegiado nº 1.106
Geólogo
Colg nº 2.049

ANDRES MARIANO|SAEZ|VIZCAINO

Firmado digitalmente por ANDRES MARIANO|SAEZ|VIZCAINO
Fecha: 2018.04.11 11:10:39 +02'00'

Fdo.: Vicente Botella Castelló
Ing. Tec. Forestal
Colegiado nº 5246

ANEXO Nº 1.-REPORT HEC-RAS

HEC-RAS HEC-RAS 5.0.3 September 2016
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X XXXXXX  XXXX     XXXX    XX    XXXX
X   X X      X   X    X  X   X X  X
X   X X      X       X  X   X  X  X
XXXXXXX XXXX   X    XXX XXXX   XXXXXX  XXXX
X   X X      X       X X    X  X     X
X   X X      X   X    X  X   X  X     X
X   X XXXXXX  XXXX     X   X  X  X  XXXXX
```

PROJECT DATA
Project Title: HECRAS2
Project File : HECRAS2.prj
Run Date and Time: 25/03/2018 19:04:35

Project in SI units

PLAN DATA

Plan Title: Plan 01
Plan File : C:\artana\HECRAS2.p01

Geometry Title: Geom 01
Geometry File : C:\artana\HECRAS2.g01

Flow Title : Flow 01
Flow File : C:\artana\HECRAS2.f01

Plan Summary Information:
Number of: Cross Sections = 10 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of iterations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow 01
Flow File : C:\artana\HECRAS2.f01

Flow Data (m3/s)

River	Reach	RS	PF 1	PF 2	PF 3
1	2	3120.519	7.78	14.48	35.51

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
1	2	PF 1	Critical	Critical
1	2	PF 2	Critical	Critical

1 2 PF 3 Critical Critical

GEOMETRY DATA

Geometry Title: Geom 01
Geometry File : C:\artana\HECRAS2.g01

CROSS SECTION

RIVER: 1
REACH: 2 RS: 3120.519

INPUT
Description:
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	188.45	19.34	197.02	38.68	204.06	58.02	210.36	77.35	209.25
96.69	201.63	116.03	192.5	135.37	183.05	154.71	174.63	174.05	166.3
193.39	157.79	212.72	151.93	232.06	155.07	251.4	160.04	270.74	163.13
284.27	162.67	290.08	162.47	309.42	158.39	328.76	158.44	348.09	158.48
367.43	161.89	386.77	171.61	406.11	181.99	423.07	191.68	425.45	193.04
444.79	204	464.13	214.09	483.46	221.37	502.8	228.58	522.14	233.3
541.48	239.29	560.82	246.17	580.16	255.26	599.5	267.52	618.83	277.6
638.17	287.37	657.51	296						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	284.27	.03	423.07	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
284.27	423.07	463.76	433.62	402.6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	153.04	Element	Left OB	Channel	Right OB
Vel Head (m)	0.22	Wt. n-Val.	0.030		
W.S. Elev (m)	152.82	Reach Len. (m)	463.76	433.62	402.60
Crit W.S. (m)	152.82	Flow Area (m2)	3.73		
E.G. Slope (m/m)	0.011970	Area (m2)	3.73		
Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	8.39	Top Width (m)	8.39		
Vel Total (m/s)	2.09	Avg. Vel. (m/s)	2.09		
Max Chl Dpth (m)	0.89	Hydr. Depth (m)	0.44		
Conv. Total (m3/s)	71.1	Conv. (m3/s)	71.1		
Length Wtd. (m)	463.76	Wetted Per. (m)	8.60		
Min Ch El (m)	158.39	Shear (N/m2)	50.86		
Alpha	1.00	Stream Power (N/m s)	106.21		
Frctn Loss (m)	6.21	Cum Volume (1000 m3)	13.45	4.09	
C & E Loss (m)	0.03	Cum SA (1000 m2)	75.03	22.05	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	153.35	Element	Left OB	Channel	Right OB
Vel Head (m)	0.28	Wt. n-Val.	0.030		
W.S. Elev (m)	153.07	Reach Len. (m)	463.76	433.62	402.60
Crit W.S. (m)	153.07	Flow Area (m2)	6.12		
E.G. Slope (m/m)	0.011014	Area (m2)	6.12		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	10.76	Top Width (m)	10.76		
Vel Total (m/s)	2.36	Avg. Vel. (m/s)	2.36		
Max Chl Dpth (m)	1.14	Hydr. Depth (m)	0.57		
Conv. Total (m3/s)	138.0	Conv. (m3/s)	138.0		

Length Wtd. (m)	463.76	Wetted Per. (m)	11.02		
Min Ch El (m)	158.39	Shear (N/m2)	60.01		
Alpha	1.00	Stream Power (N/m s)	141.87		
Frctn Loss (m)	5.69	Cum Volume (1000 m3)	21.37	6.72	
C & E Loss (m)	0.04	Cum SA (1000 m2)	91.64	27.07	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	153.97	Element	Left OB	Channel	Right OB
Vel Head (m)	0.41	Wt. n-Val.	0.030		
W.S. Elev (m)	153.56	Reach Len. (m)	463.76	433.62	402.60
Crit W.S. (m)	153.56	Flow Area (m2)	12.55		
E.G. Slope (m/m)	0.009783	Area (m2)	12.55		
Q Total (m3/s)	35.51	Flow (m3/s)	35.51		
Top Width (m)	15.41	Top Width (m)	15.41		
Vel Total (m/s)	2.83	Avg. Vel. (m/s)	2.83		
Max Chl Dpth (m)	1.63	Hydr. Depth (m)	0.81		
Conv. Total (m3/s)	359.0	Conv. (m3/s)	359.0		
Length Wtd. (m)	463.76	Wetted Per. (m)	15.78		
Min Ch El (m)	158.39	Shear (N/m2)	76.29		
Alpha	1.00	Stream Power (N/m s)	215.89		
Frctn Loss (m)	4.89	Cum Volume (1000 m3)	44.06	15.06	1.14
C & E Loss (m)	0.05	Cum SA (1000 m2)	142.40	41.17	14.71

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 2686.898

INPUT
Description:
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	96.33	19.6	94.61	39.19	92.87	58.79	92.37	78.38	93.7
97.98	93.73	117.57	93.96	137.17	95.85	156.76	97.8	176.36	99.35
195.95	101.38	215.55	103.48	235.14	104.38	235.53	104.39	254.74	105.06
274.33	105.49	293.93	103.64	313.52	101.81	333.12	107.43	352.71	117.12
372.31	125.84	375.05	126.91	391.9	133.47	411.5	140.89	431.1	146.39
450.69	152.48	470.29	154.1	489.88	151.23	509.48	145.03	529.07	136.43
548.67	128.4	568.26	123.87	587.86	122.33	607.45	120.65	627.05	117.82
646.64	119.93	666.24	125.38						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	235.53	.03	375.05	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
235.53	375.05	419.9	382.96	331.41	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	92.92	Element	Left OB	Channel	Right OB

Vel Head (m)	0.11	Wt. n-Val.	0.030		
W.S. Elev (m)	92.81	Reach Len. (m)	419.90	382.96	331.41
Crit W.S. (m)	92.81	Flow Area (m2)	5.22		
E.G. Slope (m/m)	0.015065	Area (m2)	5.22		
Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	23.73	Top Width (m)	23.73		
Vel Total (m/s)	1.49	Avg. Vel. (m/s)	1.49		
Max Chl Dpth (m)	0.44	Hydr. Depth (m)	0.22		
Conv. Total (m3/s)	63.4	Conv. (m3/s)	63.4		
Length Wtd. (m)	419.90	Wetted Per. (m)	23.75		
Min Ch El (m)	101.81	Shear (N/m2)	32.48		
Alpha	1.00	Stream Power (N/m s)	48.40		
Frctn Loss (m)	6.40	Cum Volume (1000 m3)	11.38	4.09	
C & E Loss (m)	0.00	Cum SA (1000 m2)	67.58	22.05	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	93.08	Element	Left OB	Channel	Right OB
Vel Head (m)	0.15	Wt. n-Val.	0.030		
W.S. Elev (m)	92.93	Reach Len. (m)	419.90	382.96	331.41
Crit W.S. (m)	92.93	Flow Area (m2)	8.38		
E.G. Slope (m/m)	0.013743	Area (m2)	8.38		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	28.50	Top Width (m)	28.50		
Vel Total (m/s)	1.73	Avg. Vel. (m/s)	1.73		
Max Chl Dpth (m)	0.56	Hydr. Depth (m)	0.29		
Conv. Total (m3/s)	123.5	Conv. (m3/s)	123.5		
Length Wtd. (m)	419.90	Wetted Per. (m)	28.53		
Min Ch El (m)	101.81	Shear (N/m2)	39.60		
Alpha	1.00	Stream Power (N/m s)	68.40		
Frctn Loss (m)	5.79	Cum Volume (1000 m3)	18.00	6.72	
C & E Loss (m)	0.00	Cum SA (1000 m2)	82.54	27.07	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	93.42	Element	Left OB	Channel	Right OB
Vel Head (m)	0.24	Wt. n-Val.	0.030		
W.S. Elev (m)	93.19	Reach Len. (m)	419.90	382.96	331.41
Crit W.S. (m)	93.19	Flow Area (m2)	16.53		
E.G. Slope (m/m)	0.011378	Area (m2)	16.53		
Q Total (m3/s)	35.51	Flow (m3/s)	35.51		
Top Width (m)	35.15	Top Width (m)	35.15		
Vel Total (m/s)	2.15	Avg. Vel. (m/s)	2.15		
Max Chl Dpth (m)	0.82	Hydr. Depth (m)	0.47		
Conv. Total (m3/s)	332.9	Conv. (m3/s)	332.9		
Length Wtd. (m)	419.90	Wetted Per. (m)	35.20		
Min Ch El (m)	101.81	Shear (N/m2)	52.40		
Alpha	1.00	Stream Power (N/m s)	112.55		
Frctn Loss (m)	4.89	Cum Volume (1000 m3)	37.32	15.06	1.14
C & E Loss (m)	0.00	Cum SA (1000 m2)	130.68	41.17	14.71

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 2303.937

INPUT
Description:
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	67.89	19.69	67.73	39.37	68.47	59.06	70.27	78.75	71.22
98.44	71.96	118.12	74.01	137.81	76.12	157.5	76.45	177.18	76.9
196.87	77.32	216.56	77.35	231.39	77.12	236.25	77.05	255.93	74.29
275.62	75.5	295.31	76.73	314.99	77.24	334.68	76.97	354.37	75.52
358.45	75.59	374.06	75.86	393.74	77.57	413.43	79.41	433.12	81.55
452.81	82.97	472.49	83.35	492.18	83.4	511.87	84.3	531.55	86.56
551.24	90.83	570.93	95.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	231.39	.03	358.45	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
231.39	358.45	304.18	281.56	253.54	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	68.13	Element	Left OB	Channel	Right OB
Vel Head (m)	0.10	Wt. n-Val.	0.030		
W.S. Elev (m)	68.03	Reach Len. (m)	304.18	281.56	253.54
Crit W.S. (m)	68.03	Flow Area (m2)	5.52		
E.G. Slope (m/m)	0.015403	Area (m2)	5.52		
Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	27.66	Top Width (m)	27.66		
Vel Total (m/s)	1.41	Avg. Vel. (m/s)	1.41		
Max Chl Dpth (m)	0.30	Hydr. Depth (m)	0.20		
Conv. Total (m3/s)	62.7	Conv. (m3/s)	62.7		
Length Wtd. (m)	304.18	Wetted Per. (m)	27.81		
Min Ch El (m)	74.29	Shear (N/m2)	30.00		
Alpha	1.00	Stream Power (N/m s)	42.26		
Frctn Loss (m)	4.81	Cum Volume (1000 m3)	9.12	4.09	
C & E Loss (m)	0.00	Cum SA (1000 m2)	56.79	22.05	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	68.28	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.	0.030		
W.S. Elev (m)	68.14	Reach Len. (m)	304.18	281.56	253.54
Crit W.S. (m)	68.14	Flow Area (m2)	8.62		
E.G. Slope (m/m)	0.013845	Area (m2)	8.62		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	30.49	Top Width (m)	30.49		
Vel Total (m/s)	1.68	Avg. Vel. (m/s)	1.68		
Max Chl Dpth (m)	0.41	Hydr. Depth (m)	0.28		
Conv. Total (m3/s)	123.1	Conv. (m3/s)	123.1		
Length Wtd. (m)	304.18	Wetted Per. (m)	30.75		
Min Ch El (m)	74.29	Shear (N/m2)	38.06		
Alpha	1.00	Stream Power (N/m s)	63.93		

Frctn Loss (m)	4.34	Cum Volume (1000 m3)	14.43	6.72	
C & E Loss (m)	0.01	Cum SA (1000 m2)	70.15	27.07	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	68.61	Element	Left OB	Channel	Right OB
Vel Head (m)	0.23	Wt. n-Val.	0.030		
W.S. Elev (m)	68.38	Reach Len. (m)	304.18	281.56	253.54
Crit W.S. (m)	68.38	Flow Area (m2)	16.70		
E.G. Slope (m/m)	0.011907	Area (m2)	16.70		
Q Total (m3/s)	35.51	Flow (m3/s)	35.51		
Top Width (m)	36.88	Top Width (m)	36.88		
Vel Total (m/s)	2.13	Avg. Vel. (m/s)	2.13		
Max Chl Dpth (m)	0.65	Hydr. Depth (m)	0.45		
Conv. Total (m3/s)	325.4	Conv. (m3/s)	325.4		
Length Wtd. (m)	303.91	Wetted Per. (m)	37.37		
Min Ch El (m)	74.29	Shear (N/m2)	52.18		
Alpha	1.00	Stream Power (N/m s)	110.94		
Frctn Loss (m)	3.84	Cum Volume (1000 m3)	30.34	15.06	1.14
C & E Loss (m)	0.03	Cum SA (1000 m2)	115.56	41.17	14.71

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 2022.379

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	58.65	19.23	58.03	38.46	58.16	57.68	57.59	76.91	57.8
96.14	57.28	115.37	56.78	134.6	56.46	153.82	56.99	173.05	57.11
188.66	56.99	192.28	56.96	211.51	57.58	230.74	58.25	249.97	58.14
269.19	58.33	288.42	59.86	307.65	61.09	318.45	61.28	326.88	61.43
346.11	61.82	365.33	62.39	384.56	63.2	403.79	63.86	423.02	64.08
442.25	64.5	461.47	65.4	480.7	66.29	499.93	66.43	519.16	66.58
538.39	66.92	557.62	68.06	576.84	70.02	596.07	70.38	615.3	70.78

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	188.66	.03	318.45	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
188.66	318.45	419.41	396.64	360.77	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	56.90	Element	Left OB	Channel	Right OB
Vel Head (m)	0.09	Wt. n-Val.	0.030		
W.S. Elev (m)	56.81	Reach Len. (m)	419.41	396.64	360.77
Crit W.S. (m)	56.81	Flow Area (m2)	5.82		
E.G. Slope (m/m)	0.016218	Area (m2)	5.82		

Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	32.91	Top Width (m)	32.91		
Vel Total (m/s)	1.34	Avg. Vel. (m/s)	1.34		
Max Chl Dpth (m)	0.35	Hydr. Depth (m)	0.18		
Conv. Total (m3/s)	61.1	Conv. (m3/s)	61.1		
Length Wtd. (m)	408.02	Wetted Per. (m)	32.92		
Min Ch El (m)	56.96	Shear (N/m2)	28.11		
Alpha	1.00	Stream Power (N/m s)	37.59		
Frctn Loss (m)	6.51	Cum Volume (1000 m3)	7.40	4.09	
C & E Loss (m)	0.00	Cum SA (1000 m2)	47.58	22.05	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	57.03	Element	Left OB	Channel	Right OB
Vel Head (m)	0.12	Wt. n-Val.	0.030		
W.S. Elev (m)	56.91	Reach Len. (m)	419.41	396.64	360.77
Crit W.S. (m)	56.91	Flow Area (m2)	9.42		
E.G. Slope (m/m)	0.014743	Area (m2)	9.42		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	40.27	Top Width (m)	40.27		
Vel Total (m/s)	1.54	Avg. Vel. (m/s)	1.54		
Max Chl Dpth (m)	0.45	Hydr. Depth (m)	0.23		
Conv. Total (m3/s)	119.3	Conv. (m3/s)	119.3		
Length Wtd. (m)	408.02	Wetted Per. (m)	40.28		
Min Ch El (m)	56.96	Shear (N/m2)	33.82		
Alpha	1.00	Stream Power (N/m s)	51.97		
Frctn Loss (m)	5.90	Cum Volume (1000 m3)	11.69	6.72	
C & E Loss (m)	0.00	Cum SA (1000 m2)	59.39	27.07	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	57.25	Element	Left OB	Channel	Right OB
Vel Head (m)	0.12	Wt. n-Val.	0.030	0.030	
W.S. Elev (m)	57.12	Reach Len. (m)	419.41	396.64	360.77
Crit W.S. (m)	57.12	Flow Area (m2)	22.20	0.95	
E.G. Slope (m/m)	0.013456	Area (m2)	22.20	0.95	
Q Total (m3/s)	35.51	Flow (m3/s)	34.66	0.85	
Top Width (m)	95.22	Top Width (m)	86.52	8.70	
Vel Total (m/s)	1.53	Avg. Vel. (m/s)	1.56	0.89	
Max Chl Dpth (m)	0.66	Hydr. Depth (m)	0.26	0.11	
Conv. Total (m3/s)	306.1	Conv. (m3/s)	298.8	7.3	
Length Wtd. (m)	406.83	Wetted Per. (m)	86.53	8.70	
Min Ch El (m)	56.96	Shear (N/m2)	33.86	14.47	
Alpha	1.02	Stream Power (N/m s)	52.86	12.82	
Frctn Loss (m)	4.37	Cum Volume (1000 m3)	24.43	14.92	1.14
C & E Loss (m)	0.00	Cum SA (1000 m2)	96.79	39.95	14.71

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 1625.743

INPUT
Description:
Station Elevation Data num= 37

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	49.48	19.32	49.6	38.64	49.44	57.95	49.33	77.27	49.2
96.59	49.18	114.87	49.03	115.91	49.02	135.23	48.93	154.54	48.64
173.86	47.77	193.18	48.16	212.5	48.76	213.94	48.8	231.82	49.31
251.13	49.22	270.45	48.99	289.77	48.78	309.09	48.47	328.41	48.4
347.72	48.54	367.04	48.74	386.36	48.93	405.68	49.33	425	49.46
444.31	49.65	463.63	50.31	482.95	50.34	502.27	50.3	521.59	51.33
540.9	50.6	560.22	51.01	579.54	51.15	598.86	52.04	618.18	52.78
637.49	54.03	656.81	55.34						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	114.87	.03	213.94	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
114.87	213.94	400.76	381.88	348.28	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	48.26	Element	Left OB	Channel	Right OB
Vel Head (m)	0.10	Wt. n-Val.		0.030	
W.S. Elev (m)	48.16	Reach Len. (m)	400.76	381.88	348.28
Crit W.S. (m)	48.16	Flow Area (m2)		5.52	
E.G. Slope (m/m)	0.015693	Area (m2)		5.52	
Q Total (m3/s)	7.78	Flow (m3/s)		7.78	
Top Width (m)	28.10	Top Width (m)		28.10	
Vel Total (m/s)	1.41	Avg. Vel. (m/s)		1.41	
Max Chl Dpth (m)	0.39	Hydr. Depth (m)		0.20	
Conv. Total (m3/s)	62.1	Conv. (m3/s)		62.1	
Length Wtd. (m)	381.88	Wetted Per. (m)		28.11	
Min Ch El (m)	47.77	Shear (N/m2)		30.20	
Alpha	1.00	Stream Power (N/m s)		42.59	
Frctn Loss (m)	5.79	Cum Volume (1000 m3)	6.17	2.99	
C & E Loss (m)	0.00	Cum SA (1000 m2)	40.68	16.47	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	48.41	Element	Left OB	Channel	Right OB
Vel Head (m)	0.13	Wt. n-Val.		0.030	
W.S. Elev (m)	48.27	Reach Len. (m)	400.76	381.88	348.28
Crit W.S. (m)	48.27	Flow Area (m2)		8.92	
E.G. Slope (m/m)	0.014184	Area (m2)		8.92	
Q Total (m3/s)	14.48	Flow (m3/s)		14.48	
Top Width (m)	34.05	Top Width (m)		34.05	
Vel Total (m/s)	1.62	Avg. Vel. (m/s)		1.62	
Max Chl Dpth (m)	0.50	Hydr. Depth (m)		0.26	
Conv. Total (m3/s)	121.6	Conv. (m3/s)		121.6	
Length Wtd. (m)	381.88	Wetted Per. (m)		34.07	
Min Ch El (m)	47.77	Shear (N/m2)		36.40	
Alpha	1.00	Stream Power (N/m s)		59.12	
Frctn Loss (m)	5.25	Cum Volume (1000 m3)	9.71	4.95	
C & E Loss (m)	0.00	Cum SA (1000 m2)	50.94	20.31	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated

water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	48.68	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.		0.030	0.030
W.S. Elev (m)	48.53	Reach Len. (m)	400.76	381.88	348.28
Crit W.S. (m)	48.53	Flow Area (m2)		19.65	3.22
E.G. Slope (m/m)	0.008762	Area (m2)		19.65	3.22
Q Total (m3/s)	35.51	Flow (m3/s)		33.69	1.82
Top Width (m)	89.75	Top Width (m)		48.25	41.50
Vel Total (m/s)	1.55	Avg. Vel. (m/s)		1.71	0.57
Max Chl Dpth (m)	0.76	Hydr. Depth (m)		0.41	0.08
Conv. Total (m3/s)	379.4	Conv. (m3/s)		359.9	19.5
Length Wtd. (m)	381.98	Wetted Per. (m)		48.27	41.50
Min Ch El (m)	47.77	Shear (N/m2)		34.98	6.66
Alpha	1.16	Stream Power (N/m s)		59.96	3.78
Frctn Loss (m)	3.29	Cum Volume (1000 m3)	19.77	10.84	0.56
C & E Loss (m)	0.00	Cum SA (1000 m2)	78.65	28.66	7.23

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 1243.868

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	41.71	19.54	41.56	39.09	41.38	58.63	41.07	78.18	41.22
97.72	41.72	117.26	42	136.81	41.77	154.08	41.57	156.35	41.54
175.9	41.38	195.44	40.39	214.98	41.19	234.53	41.6	254.07	41.67
257.19	41.69	273.61	41.78	293.16	42	312.7	42.11	332.25	42.13
351.79	42.14	371.33	42.18	390.88	42.25	410.42	42.35	429.97	42.33
449.51	42.45	469.05	42.61	488.6	42.75	508.14	42.69	527.69	42.47
547.23	42.29	566.77	42.1	586.32	41.93	605.86	41.84	625.4	42.45
644.95	42.34	664.49	42.28	684.04	42.12	703.58	42.4	723.12	42.72
742.67	42.83	762.21	42.85	781.76	43.74	801.3	43.74	820.84	47.47
840.39	51.12	859.93	56.44	879.48	65.11	899.02	73.94	918.56	84.77
938.11	99.23								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	154.08	.03	257.19	.03

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
154.08 257.19 244.32 228.41 211.31 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	40.99	Element	Left OB	Channel	Right OB
Vel Head (m)	0.12	Wt. n-Val.		0.030	
W.S. Elev (m)	40.87	Reach Len. (m)	244.32	228.41	211.31
Crit W.S. (m)	40.87	Flow Area (m2)		5.02	
E.G. Slope (m/m)	0.014670	Area (m2)		5.02	
Q Total (m3/s)	7.78	Flow (m3/s)		7.78	
Top Width (m)	21.05	Top Width (m)		21.05	
Vel Total (m/s)	1.55	Avg. Vel. (m/s)		1.55	
Max Chl Dpth (m)	0.48	Hydr. Depth (m)		0.24	
Conv. Total (m3/s)	64.2	Conv. (m3/s)		64.2	
Length Wtd. (m)	236.37	Wetted Per. (m)		21.07	
Min Ch El (m)	40.39	Shear (N/m2)		34.25	
Alpha	1.00	Stream Power (N/m s)		53.12	
Frctn Loss (m)	1.61	Cum Volume (1000 m3)	6.17	0.98	
C & E Loss (m)	0.03	Cum SA (1000 m2)	40.68	7.09	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	41.16	Element	Left OB	Channel	Right OB
Vel Head (m)	0.16	Wt. n-Val.		0.030	
W.S. Elev (m)	41.00	Reach Len. (m)	244.32	228.41	211.31
Crit W.S. (m)	41.00	Flow Area (m2)		8.29	
E.G. Slope (m/m)	0.013314	Area (m2)		8.29	
Q Total (m3/s)	14.48	Flow (m3/s)		14.48	
Top Width (m)	27.06	Top Width (m)		27.06	
Vel Total (m/s)	1.75	Avg. Vel. (m/s)		1.75	
Max Chl Dpth (m)	0.61	Hydr. Depth (m)		0.31	
Conv. Total (m3/s)	125.5	Conv. (m3/s)		125.5	
Length Wtd. (m)	236.37	Wetted Per. (m)		27.09	
Min Ch El (m)	40.39	Shear (N/m2)		39.96	
Alpha	1.00	Stream Power (N/m s)		69.80	
Frctn Loss (m)	1.54	Cum Volume (1000 m3)	9.71	1.66	
C & E Loss (m)	0.03	Cum SA (1000 m2)	50.94	8.65	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	41.44	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.	0.030	0.030	
W.S. Elev (m)	41.30	Reach Len. (m)	244.32	228.41	211.31
Crit W.S. (m)	41.30	Flow Area (m2)	4.69	18.27	
E.G. Slope (m/m)	0.008449	Area (m2)	4.69	18.27	
Q Total (m3/s)	35.51	Flow (m3/s)	3.64	31.87	
Top Width (m)	79.31	Top Width (m)	36.81	42.50	
Vel Total (m/s)	1.55	Avg. Vel. (m/s)	0.78	1.74	
Max Chl Dpth (m)	0.91	Hydr. Depth (m)	0.13	0.43	
Conv. Total (m3/s)	386.3	Conv. (m3/s)	39.6	346.7	
Length Wtd. (m)	237.18	Wetted Per. (m)	36.81	42.54	
Min Ch El (m)	40.39	Shear (N/m2)	10.56	35.59	
Alpha	1.17	Stream Power (N/m s)	8.19	62.08	
Frctn Loss (m)	1.47	Cum Volume (1000 m3)	18.83	3.59	
C & E Loss (m)	0.02	Cum SA (1000 m2)	71.27	11.33	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 1015.459

INPUT
Description:

Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	35.42	19.58	35.38	39.16	35.56	58.75	35.82	78.33	35.96
97.91	36.33	117.49	36.15	137.07	36.25	156.66	36.45	176.24	36.8
195.82	37.13	215.4	37.27	234.98	37.12	254.57	37.09	254.73	37.09
274.15	37.29	293.73	37.59	313.31	37.65	332.89	37.75	352.48	37.83
365.95	37.7	372.06	37.64	391.64	37.49	411.22	37.44	430.8	37.67
450.38	38.37	469.97	38.42	489.55	38.53	509.13	38.42	528.71	38.42
548.29	39.45	567.88	39.87	587.46	39.8	607.04	39.7	626.62	39.71
646.2	39.58	665.79	39.48	685.37	39.46	704.95	39.32	724.53	39.26
744.11	39.27	763.7	39.06	783.28	39.63	802.86	39.1	822.44	39.12
842.02	39.47	861.61	39.6	881.19	39.53	900.77	39.94	920.35	40
939.93	40.44	959.52	40.93	979.1	41.99	998.68	43.92	1018.26	47.02
1037.84	51.51	1057.43	58.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	254.73	.03	365.95	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
254.73	365.95	150.51	151.33	153.14	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	35.71	Element	Left OB	Channel	Right OB
Vel Head (m)	0.03	Wt. n-Val.	0.030		
W.S. Elev (m)	35.69	Reach Len. (m)	150.51	151.33	153.14
Crit W.S. (m)		Flow Area (m2)	10.44		
E.G. Slope (m/m)	0.003921	Area (m2)	10.44		
Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	48.67	Top Width (m)	48.67		
Vel Total (m/s)	0.75	Avg. Vel. (m/s)	0.75		
Max Chl Dpth (m)	0.31	Hydr. Depth (m)	0.21		
Conv. Total (m3/s)	124.2	Conv. (m3/s)	124.2		
Length Wtd. (m)	150.51	Wetted Per. (m)	48.93		
Min Ch El (m)	37.09	Shear (N/m2)	8.20		
Alpha	1.00	Stream Power (N/m s)	6.11		
Frctn Loss (m)	1.03	Cum Volume (1000 m3)	4.90	0.41	
C & E Loss (m)	0.00	Cum SA (1000 m2)	34.73	4.69	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	35.84	Element	Left OB	Channel	Right OB
Vel Head (m)	0.04	Wt. n-Val.	0.030		
W.S. Elev (m)	35.80	Reach Len. (m)	150.51	151.33	153.14
Crit W.S. (m)		Flow Area (m2)	16.21		
E.G. Slope (m/m)	0.003864	Area (m2)	16.21		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	56.91	Top Width (m)	56.91		
Vel Total (m/s)	0.89	Avg. Vel. (m/s)	0.89		
Max Chl Dpth (m)	0.42	Hydr. Depth (m)	0.28		
Conv. Total (m3/s)	233.0	Conv. (m3/s)	233.0		
Length Wtd. (m)	150.51	Wetted Per. (m)	57.28		
Min Ch El (m)	37.09	Shear (N/m2)	10.72		
Alpha	1.00	Stream Power (N/m s)	9.58		
Frctn Loss (m)	1.07	Cum Volume (1000 m3)	7.73	0.72	
C & E Loss (m)	0.00	Cum SA (1000 m2)	43.99	5.56	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	36.07	Element	Left OB	Channel	Right OB
Vel Head (m)	0.07	Wt. n-Val.	0.030		
W.S. Elev (m)	35.99	Reach Len. (m)	150.51	151.33	153.14
Crit W.S. (m)		Flow Area (m2)	29.97		
E.G. Slope (m/m)	0.004735	Area (m2)	29.97		
Q Total (m3/s)	35.51	Flow (m3/s)	35.51		
Top Width (m)	80.17	Top Width (m)	80.17		
Vel Total (m/s)	1.18	Avg. Vel. (m/s)	1.18		
Max Chl Dpth (m)	0.61	Hydr. Depth (m)	0.37		
Conv. Total (m3/s)	516.0	Conv. (m3/s)	516.0		
Length Wtd. (m)	150.51	Wetted Per. (m)	80.75		
Min Ch El (m)	37.09	Shear (N/m2)	17.24		
Alpha	1.00	Stream Power (N/m s)	20.42		
Frctn Loss (m)	1.13	Cum Volume (1000 m3)	14.60	1.51	
C & E Loss (m)	0.00	Cum SA (1000 m2)	56.98	6.47	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 864.1274

INPUT
Description:
Station Elevation Data num= 50

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	34.37	19.31	34.44	38.61	34.67	57.92	34.62	77.22	34.51
96.53	35.1	115.84	35.48	135.14	35.03	154.45	34.65	173.75	35.1
193.06	35.3	212.37	35.46	224.68	35.86	231.67	36.09	250.98	35.63
270.28	35.27	289.59	34.85	308.9	35.13	328.2	35.17	337.94	35.36
347.51	35.55	366.81	35.7	386.12	35.67	405.43	35.52	424.73	35.73
444.04	35.82	463.34	35.81	482.65	35.82	501.96	35.89	521.26	35.83
540.57	35.89	559.87	36.05	579.18	35.84	598.49	35.98	617.79	36.32
637.1	37.06	656.4	38.13	675.71	38.16	695.02	37.02	714.32	36.06
733.63	35.94	752.93	36.41	772.24	37.21	791.55	37.08	810.85	36.97
830.16	37.21	849.46	38.02	868.77	37.82	888.08	37.21	907.38	37.52

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	224.68	.03	337.94	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
224.68	337.94	310.39	308.13	307.1	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	34.69	Element	Left OB	Channel	Right OB
Vel Head (m)	0.06	Wt. n-Val.	0.030		
W.S. Elev (m)	34.63	Reach Len. (m)	310.39	308.13	307.10
Crit W.S. (m)	34.63	Flow Area (m2)	7.17		
E.G. Slope (m/m)	0.014726	Area (m2)	7.17		
Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	60.70	Top Width (m)	60.70		
Vel Total (m/s)	1.08	Avg. Vel. (m/s)	1.08		
Max Chl Dpth (m)	0.26	Hydr. Depth (m)	0.12		
Conv. Total (m3/s)	64.1	Conv. (m3/s)	64.1		
Length Wtd. (m)	310.39	Wetted Per. (m)	60.96		
Min Ch El (m)	34.85	Shear (N/m2)	16.99		
Alpha	1.00	Stream Power (N/m s)	18.43		
Frctn Loss (m)	4.25	Cum Volume (1000 m3)	3.57	0.41	
C & E Loss (m)	0.00	Cum SA (1000 m2)	26.50	4.69	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	34.76	Element	Left OB	Channel	Right OB
Vel Head (m)	0.07	Wt. n-Val.	0.030		
W.S. Elev (m)	34.69	Reach Len. (m)	310.39	308.13	307.10
Crit W.S. (m)	34.69	Flow Area (m2)	12.10		
E.G. Slope (m/m)	0.017220	Area (m2)	12.10		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	87.02	Top Width (m)	87.02		
Vel Total (m/s)	1.20	Avg. Vel. (m/s)	1.20		
Max Chl Dpth (m)	0.32	Hydr. Depth (m)	0.14		
Conv. Total (m3/s)	110.3	Conv. (m3/s)	110.3		
Length Wtd. (m)	310.39	Wetted Per. (m)	87.35		
Min Ch El (m)	34.85	Shear (N/m2)	23.40		
Alpha	1.00	Stream Power (N/m s)	27.99		
Frctn Loss (m)	4.54	Cum Volume (1000 m3)	5.60	0.72	
C & E Loss (m)	0.00	Cum SA (1000 m2)	33.16	5.56	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	34.93	Element	Left OB	Channel	Right OB
Vel Head (m)	0.12	Wt. n-Val.	0.030		
W.S. Elev (m)	34.81	Reach Len. (m)	310.39	308.13	307.10
Crit W.S. (m)	34.81	Flow Area (m2)	23.33		
E.G. Slope (m/m)	0.013775	Area (m2)	23.33		
Q Total (m3/s)	35.51	Flow (m3/s)	35.51		
Top Width (m)	102.05	Top Width (m)	102.05		
Vel Total (m/s)	1.52	Avg. Vel. (m/s)	1.52		
Max Chl Dpth (m)	0.44	Hydr. Depth (m)	0.23		
Conv. Total (m3/s)	302.6	Conv. (m3/s)	302.6		
Length Wtd. (m)	310.39	Wetted Per. (m)	102.50		
Min Ch El (m)	34.85	Shear (N/m2)	30.75		
Alpha	1.00	Stream Power (N/m s)	46.80		
Frctn Loss (m)	4.25	Cum Volume (1000 m3)	10.58	1.51	
C & E Loss (m)	0.00	Cum SA (1000 m2)	43.27	6.47	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 555.9936

INPUT

Description:
Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	29.24	19.47	29.6	38.93	29.83	58.4	30.38	77.87	30.06
97.34	29.53	116.8	29.27	136.27	29.44	155.74	30.76	175.21	33.4
194.67	33.3	214.14	31.13	233.61	30.56	253.08	30.15	272.54	30.98
292.01	30.56	311.48	30.1	330.95	31.11	350.41	30.81	356.03	30.71
369.88	30.48	389.35	29.81	408.81	30.15	428.28	30.93	447.75	30.2
467.22	30.26	468.74	30.27	486.68	30.45	506.15	30.31	525.62	30.47
545.09	30.68	564.55	30.62	584.02	30.76	603.49	31	622.96	31.33
642.42	31.16	661.89	31.25	681.36	31.58	700.83	31.3	720.29	31.05

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	356.03	.03	468.74	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
356.03	468.74	218.12	216.28	214.09	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	29.57	Element	Left OB	Channel	Right OB
Vel Head (m)	0.05	Wt. n-Val.	0.030		
W.S. Elev (m)	29.52	Reach Len. (m)	218.12	216.28	214.09
Crit W.S. (m)	29.50	Flow Area (m2)	7.66		
E.G. Slope (m/m)	0.012767	Area (m2)	7.66		
Q Total (m3/s)	7.78	Flow (m3/s)	7.78		
Top Width (m)	54.34	Top Width (m)	54.34		
Vel Total (m/s)	1.02	Avg. Vel. (m/s)	1.02		
Max Chl Dpth (m)	0.28	Hydr. Depth (m)	0.14		
Conv. Total (m3/s)	68.9	Conv. (m3/s)	68.9		
Length Wtd. (m)	217.77	Wetted Per. (m)	54.62		
Min Ch El (m)	29.81	Shear (N/m2)	17.55		
Alpha	1.00	Stream Power (N/m s)	17.83		
Frctn Loss (m)	2.97	Cum Volume (1000 m3)	1.27	0.41	
C & E Loss (m)	0.00	Cum SA (1000 m2)	8.65	4.69	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	29.67	Element	Left OB	Channel	Right OB
Vel Head (m)	0.08	Wt. n-Val.	0.030		
W.S. Elev (m)	29.59	Reach Len. (m)	218.12	216.28	214.09
Crit W.S. (m)	29.57	Flow Area (m2)	11.77		
E.G. Slope (m/m)	0.012588	Area (m2)	11.77		
Q Total (m3/s)	14.48	Flow (m3/s)	14.48		
Top Width (m)	62.19	Top Width (m)	62.19		
Vel Total (m/s)	1.23	Avg. Vel. (m/s)	1.23		
Max Chl Dpth (m)	0.35	Hydr. Depth (m)	0.19		
Conv. Total (m3/s)	129.1	Conv. (m3/s)	129.1		
Length Wtd. (m)	217.68	Wetted Per. (m)	62.55		
Min Ch El (m)	29.81	Shear (N/m2)	23.23		
Alpha	1.00	Stream Power (N/m s)	28.58		
Frctn Loss (m)	2.99	Cum Volume (1000 m3)	1.90	0.72	
C & E Loss (m)	0.00	Cum SA (1000 m2)	10.00	5.56	

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	29.86	Element	Left OB	Channel	Right OB
Vel Head (m)	0.14	Wt. n-Val.	0.030		
W.S. Elev (m)	29.73	Reach Len. (m)	218.12	216.28	214.09
Crit W.S. (m)	29.73	Flow Area (m2)	21.77		

E.G. Slope (m/m)	0.013581	Area (m2)	21.77		
Q Total (m3/s)	35.51	Flow (m3/s)	35.51		
Top Width (m)	80.93	Top Width (m)	80.93		
Vel Total (m/s)	1.63	Avg. Vel. (m/s)	1.63		
Max Chl Dpth (m)	0.49	Hydr. Depth (m)	0.27		
Conv. Total (m3/s)	304.7	Conv. (m3/s)	304.7		
Length Wtd. (m)	217.59	Wetted Per. (m)	81.44		
Min Ch El (m)	29.81	Shear (N/m2)	35.60		
Alpha	1.00	Stream Power (N/m s)	58.07		
Frctn Loss (m)	2.98	Cum Volume (1000 m3)	3.58	1.51	
C & E Loss (m)	0.01	Cum SA (1000 m2)	14.87	6.47	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning: There is no flow in the channel. Check that the channel stations are correctly coded. To force flow into the channel, a levee or ineffective flow may have to be added or the Manning's n of the overbank could be increased.

CROSS SECTION

RIVER: 1
REACH: 2 RS: 339.7166

INPUT
Description:
Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	26.8	19.18	26.22	38.36	26.65	57.55	26.7	76.73	30.91
95.91	31.59	115.09	30.61	134.28	27.02	153.46	27.04	172.64	26.96
191.82	26.95	211.01	27.5	230.19	27.21	249.37	27.01	268.55	27.04
287.73	27.11	306.92	27.18	308.99	27.19	326.1	27.31	345.28	26.3
364.46	26.56	383.65	26.44	402.83	26.86	417.62	27.16	422.01	27.25
441.19	27.64	460.38	27.93	479.56	27.99	498.74	27.98	517.92	28.02
537.11	28.1	556.29	28.22	575.47	28.18				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	308.99	.03	417.62	.03

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
308.99	417.62	322.6	339.72	308.07	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (m)	26.60	Element	Left OB	Channel	Right OB
Vel Head (m)	0.06	Wt. n-Val.	0.030	0.030	
W.S. Elev (m)	26.54	Reach Len. (m)			
Crit W.S. (m)	26.54	Flow Area (m2)	4.02	3.77	
E.G. Slope (m/m)	0.014646	Area (m2)	4.02	3.77	
Q Total (m3/s)	7.78	Flow (m3/s)	4.79	2.99	
Top Width (m)	68.31	Top Width (m)	24.98	43.33	
Vel Total (m/s)	1.00	Avg. Vel. (m/s)	1.19	0.79	
Max Chl Dpth (m)	0.32	Hydr. Depth (m)	0.16	0.09	
Conv. Total (m3/s)	64.3	Conv. (m3/s)	39.6	24.7	
Length Wtd. (m)		Wetted Per. (m)	24.99	43.34	
Min Ch El (m)	26.30	Shear (N/m2)	23.08	12.51	
Alpha	1.12	Stream Power (N/m s)	27.53	9.91	
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (m)	26.68	Element	Left OB	Channel	Right OB
Vel Head (m)	0.08	Wt. n-Val.	0.030	0.030	
W.S. Elev (m)	26.60	Reach Len. (m)			
Crit W.S. (m)	26.60	Flow Area (m2)	5.61	6.62	

E.G. Slope (m/m)	0.015034	Area (m2)		5.61	6.62
Q Total (m3/s)	14.48	Flow (m3/s)		7.57	6.91
Top Width (m)	80.90	Top Width (m)		29.52	51.38
Vel Total (m/s)	1.18	Avg. Vel. (m/s)		1.35	1.04
Max Chl Dpth (m)	0.38	Hydr. Depth (m)		0.19	0.13
Conv. Total (m3/s)	118.1	Conv. (m3/s)		61.8	56.3
Length Wtd. (m)		Wetted Per. (m)		29.53	51.39
Min Ch El (m)	26.30	Shear (N/m2)		28.00	19.00
Alpha	1.05	Stream Power (N/m s)		37.81	19.82
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (m)	26.83	Element	Left OB	Channel	Right OB
Vel Head (m)	0.10	Wt. n-Val.	0.030	0.030	
W.S. Elev (m)	26.73	Reach Len. (m)			
Crit W.S. (m)	26.73	Flow Area (m2)	11.09	13.93	
E.G. Slope (m/m)	0.013808	Area (m2)	11.09	13.93	
Q Total (m3/s)	35.51	Flow (m3/s)	14.87	20.64	
Top Width (m)	115.30	Top Width (m)	55.42	59.88	
Vel Total (m/s)	1.42	Avg. Vel. (m/s)	1.34	1.48	
Max Chl Dpth (m)	0.51	Hydr. Depth (m)	0.20	0.23	
Conv. Total (m3/s)	302.2	Conv. (m3/s)	126.5	175.7	
Length Wtd. (m)		Wetted Per. (m)	55.44	59.89	
Min Ch El (m)	26.30	Shear (N/m2)	27.10	31.50	
Alpha	1.01	Stream Power (N/m s)	36.32	46.67	
Frctn Loss (m)		Cum Volume (1000 m3)			
C & E Loss (m)		Cum SA (1000 m2)			

Warning: Divided flow computed for this cross-section.

SUMMARY OF MANNING'S N VALUES

River:1

Reach	River Sta.	n1	n2	n3
2	3120.519	.03	.03	.03
2	2686.898	.03	.03	.03
2	2303.937	.03	.03	.03
2	2022.379	.03	.03	.03
2	1625.743	.03	.03	.03
2	1243.868	.03	.03	.03
2	1015.459	.03	.03	.03
2	864.1274	.03	.03	.03
2	555.9936	.03	.03	.03
2	339.7166	.03	.03	.03

SUMMARY OF REACH LENGTHS

River: 1

Reach	River Sta.	Left	Channel	Right
2	3120.519	463.76	433.62	402.6
2	2686.898	419.9	382.96	331.41
2	2303.937	304.18	281.56	253.54
2	2022.379	419.41	396.64	360.77
2	1625.743	400.76	381.88	348.28
2	1243.868	244.32	228.41	211.31
2	1015.459	150.51	151.33	153.14
2	864.1274	310.39	308.13	307.1
2	555.9936	218.12	216.28	214.09
2	339.7166	322.6	339.72	308.07

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: 1

Reach	River Sta.	Contr.	Expan.
2	3120.519	.1	.3
2	2686.898	.1	.3
2	2303.937	.1	.3
2	2022.379	.1	.3
2	1625.743	.1	.3
2	1243.868	.1	.3
2	1015.459	.1	.3
2	864.1274	.1	.3
2	555.9936	.1	.3
2	339.7166	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		
2	3120.519	PF 1	7.78	158.39	152.82	152.82	153.04	0.011970		3.73	8.39	0.00
2	3120.519	PF 2	14.48	158.39	153.07	153.07	153.35	0.011014		6.12	10.76	0.00
2	3120.519	PF 3	35.51	158.39	153.56	153.56	153.97	0.009783		12.55	15.41	0.00
2	2686.898	PF 1	7.78	101.81	92.81	92.81	92.92	0.015065		5.22	23.73	0.00
2	2686.898	PF 2	14.48	101.81	92.93	92.93	93.08	0.013743		8.38	28.50	0.00
2	2686.898	PF 3	35.51	101.81	93.19	93.19	93.42	0.011378		16.53	35.15	0.00
2	2303.937	PF 1	7.78	74.29	68.03	68.03	68.13	0.015403		5.52	27.66	0.00
2	2303.937	PF 2	14.48	74.29	68.14	68.14	68.28	0.013845		8.62	30.49	0.00
2	2303.937	PF 3	35.51	74.29	68.38	68.38	68.61	0.011907		16.70	36.88	0.00
2	2022.379	PF 1	7.78	56.96	56.81	56.81	56.90	0.016218		5.82	32.91	0.00
2	2022.379	PF 2	14.48	56.96	56.91	56.91	57.03	0.014743		9.42	40.27	0.00
2	2022.379	PF 3	35.51	56.96	57.12	57.12	57.25	0.013456	0.89	23.16	95.22	0.85
2	1625.743	PF 1	7.78	47.77	48.16	48.16	48.26	0.015693	1.41	5.52	28.10	1.02
2	1625.743	PF 2	14.48	47.77	48.27	48.27	48.41	0.014184	1.62	8.92	34.05	1.01
2	1625.743	PF 3	35.51	47.77	48.53	48.53	48.68	0.008762	1.71	22.87	89.75	0.86
2	1243.868	PF 1	7.78	40.39	40.87	40.87	40.99	0.014670	1.55	5.02	21.05	1.01
2	1243.868	PF 2	14.48	40.39	41.00	41.00	41.16	0.013314	1.75	8.29	27.06	1.01
2	1243.868	PF 3	35.51	40.39	41.30	41.30	41.44	0.008449	1.74	22.96	79.31	0.85
2	1015.459	PF 1	7.78	37.09	35.69		35.71	0.003921		10.44	48.67	0.00
2	1015.459	PF 2	14.48	37.09	35.80		35.84	0.003864		16.21	56.91	0.00
2	1015.459	PF 3	35.51	37.09	35.99		36.07	0.004735		29.97	80.17	0.00
2	864.1274	PF 1	7.78	34.85	34.63	34.63	34.69	0.014726		7.17	60.70	0.00
2	864.1274	PF 2	14.48	34.85	34.69	34.69	34.76	0.017220		12.10	87.02	0.00
2	864.1274	PF 3	35.51	34.85	34.81	34.81	34.93	0.013775		23.33	102.05	0.00
2	555.9936	PF 1	7.78	29.81	29.52	29.50	29.57	0.012767		7.66	54.34	0.00
2	555.9936	PF 2	14.48	29.81	29.59	29.57	29.67	0.012588		11.77	62.19	0.00
2	555.9936	PF 3	35.51	29.81	29.73	29.73	29.86	0.013581		21.77	80.93	0.00
2	339.7166	PF 1	7.78	26.30	26.54	26.54	26.60	0.014646	0.79	7.79	68.31	0.86
2	339.7166	PF 2	14.48	26.30	26.60	26.60	26.68	0.015034	1.04	12.23	80.90	0.93
2	339.7166	PF 3	35.51	26.30	26.73	26.73	26.83	0.013808	1.48	25.03	115.30	0.98

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m)	
2	3120.519	PF 1	153.04	152.82	0.22	6.21	0.03	7.78		8.39	
2	3120.519	PF 2	153.35	153.07	0.28	5.69	0.04	14.48		10.76	
2	3120.519	PF 3	153.97	153.56	0.41	4.89	0.05	35.51		15.41	
2	2686.898	PF 1	92.92	92.81	0.11	6.40	0.00	7.78		23.73	
2	2686.898	PF 2	93.08	92.93	0.15	5.79	0.00	14.48		28.50	
2	2686.898	PF 3	93.42	93.19	0.24	4.89	0.00	35.51		35.15	

2	2303.937	PF 1	68.13	68.03	0.10	4.81	0.00	7.78			27.66
2	2303.937	PF 2	68.28	68.14	0.14	4.34	0.01	14.48			30.49
2	2303.937	PF 3	68.61	68.38	0.23	3.84	0.03	35.51			36.88
2	2022.379	PF 1	56.90	56.81	0.09	6.51	0.00	7.78			32.91
2	2022.379	PF 2	57.03	56.91	0.12	5.90	0.00	14.48			40.27
2	2022.379	PF 3	57.25	57.12	0.12	4.37	0.00	34.66	0.85		95.22
2	1625.743	PF 1	48.26	48.16	0.10	5.79	0.00	7.78			28.10
2	1625.743	PF 2	48.41	48.27	0.13	5.25	0.00	14.48			34.05
2	1625.743	PF 3	48.68	48.53	0.14	3.29	0.00	33.69	1.82		89.75
2	1243.868	PF 1	40.99	40.87	0.12	1.61	0.03	7.78			21.05
2	1243.868	PF 2	41.16	41.00	0.16	1.54	0.03	14.48			27.06
2	1243.868	PF 3	41.44	41.30	0.14	1.47	0.02	3.64	31.87		79.31
2	1015.459	PF 1	35.71	35.69	0.03	1.03	0.00	7.78			48.67
2	1015.459	PF 2	35.84	35.80	0.04	1.07	0.00	14.48			56.91
2	1015.459	PF 3	36.07	35.99	0.07	1.13	0.00	35.51			80.17
2	864.1274	PF 1	34.69	34.63	0.06	4.25	0.00	7.78			60.70
2	864.1274	PF 2	34.76	34.69	0.07	4.54	0.00	14.48			87.02
2	864.1274	PF 3	34.93	34.81	0.12	4.25	0.00	35.51			102.05
2	555.9936	PF 1	29.57	29.52	0.05	2.97	0.00	7.78			54.34
2	555.9936	PF 2	29.67	29.59	0.08	2.99	0.00	14.48			62.19
2	555.9936	PF 3	29.86	29.73	0.14	2.98	0.01	35.51			80.93
2	339.7166	PF 1	26.60	26.54	0.06			4.79	2.99		68.31
2	339.7166	PF 2	26.68	26.60	0.08			7.57	6.91		80.90
2	339.7166	PF 3	26.83	26.73	0.10			14.87	20.64		115.30

Profile Output Table - Culvert Only

Reach	River Sta	Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
			(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m)	(m/s)	(m/s)

Profile Output Table - Four XS Culvert

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)		(m)

Profile Output Table - Six XS Bridge

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Crit W.S.	Frctn Loss	C & E Loss	Top Width	Q Left	Q Channel	Q Right	Vel Chnl
			(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(m3/s)		(m/s)

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US.	Min El Prs	BR Open Area	Prs O WS	Q Total	Min El Weir Flow	Q Weir	Delta EG	BR Sluice Coef
			(m)	(m)	(m2)	(m)	(m3/s)	(m)	(m3/s)	(m)		

Profile Output Table - Bridge Comparison

Reach	River Sta	Profile	E.G. US.	W.S. US.	BR Sel Method	Energy EG	Momen. EG	Yarnell EG	WSPRO EG	Prs O EG	Prs/Wr EG	Energy/Wr EG
			(m)	(m)		(m)	(m)	(m)	(m)	(m)	(m)	

Profile Output Table - Multiple Opening

Reach	River Sta	Profile	Q Total (m3/s)	Flow Area (m2)	E.G. US. (m)	W.S. US. (m)	Top Wdth Act (m)	Vel Total (m/s)	Crit W.S. (m)	Left Stagn (m)	Right Stagn (m)

Profile Output Table - Four XS Inline Structure

Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Vel Head (m)	Frctn Loss (m)	C & E Loss (m3/s)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Top Width (m)

Profile Output Table - Inline Structure

Reach	River Sta	Profile	E.G. Elev (m)	W.S. Elev (m)	Q Total (m3/s)	Q Weir (m3/s)	Q Gates (m3/s)	Q Culv (m3/s)	Q Inline RC (m3/s)	Q Outlet TS	Q Breach

Profile Output Table - Lateral Structures

Reach	River Sta	Profile	Q US (m3/s)	Q Leaving Total (m3/s)	Q DS (m3/s)	Q Weir (m3/s)	Q Gates (m3/s)	Wr Top Wdth (m)	Weir Max Depth (m)	Weir Avg Depth (m)	Min El Weir Flow (m)	E.G. US. (m)	W.S. US. (m)	E.G. DS (m)	W.S. DS (m)

Profile Output Table - Encroachment 1

Reach	River Sta	Profile	W.S. Elev (m)	Prof Delta WS (m)	E.G. Elev (m)	Top Wdth Act (m)	Q Left (m3/s)	Q Channel (m3/s)	Q Right (m3/s)	Enc Sta L (m)	Ch Sta L (m)	Ch Sta R (m)	Enc Sta R (m)
2	3120.519	PF 1	152.82		153.04	8.39	7.78			284.27	423.07		
2	3120.519	PF 2	153.07	0.25	153.35	10.76	14.48			284.27	423.07		
2	3120.519	PF 3	153.56	0.74	153.97	15.41	35.51			284.27	423.07		
2	2686.898	PF 1	92.81		92.92	23.73	7.78			235.53	375.05		
2	2686.898	PF 2	92.93	0.12	93.08	28.50	14.48			235.53	375.05		
2	2686.898	PF 3	93.19	0.38	93.42	35.15	35.51			235.53	375.05		
2	2303.937	PF 1	68.03		68.13	27.66	7.78			231.39	358.45		
2	2303.937	PF 2	68.14	0.11	68.28	30.49	14.48			231.39	358.45		
2	2303.937	PF 3	68.38	0.35	68.61	36.88	35.51			231.39	358.45		
2	2022.379	PF 1	56.81		56.90	32.91	7.78			188.66	318.45		
2	2022.379	PF 2	56.91	0.10	57.03	40.27	14.48			188.66	318.45		
2	2022.379	PF 3	57.12	0.32	57.25	95.22	34.66	0.85		188.66	318.45		
2	1625.743	PF 1	48.16		48.26	28.10	7.78			114.87	213.94		
2	1625.743	PF 2	48.27	0.11	48.41	34.05	14.48			114.87	213.94		
2	1625.743	PF 3	48.53	0.37	48.68	89.75	33.69	1.82		114.87	213.94		
2	1243.868	PF 1	40.87		40.99	21.05	7.78			154.08	257.19		
2	1243.868	PF 2	41.00	0.14	41.16	27.06	14.48			154.08	257.19		
2	1243.868	PF 3	41.30	0.43	41.44	79.31	3.64	31.87		154.08	257.19		
2	1015.459	PF 1	35.69		35.71	48.67	7.78			254.73	365.95		
2	1015.459	PF 2	35.80	0.11	35.84	56.91	14.48			254.73	365.95		
2	1015.459	PF 3	35.99	0.31	36.07	80.17	35.51			254.73	365.95		
2	864.1274	PF 1	34.63		34.69	60.70	7.78			224.68	337.94		
2	864.1274	PF 2	34.69	0.06	34.76	87.02	14.48			224.68	337.94		
2	864.1274	PF 3	34.81	0.18	34.93	102.05	35.51			224.68	337.94		
2	555.9936	PF 1	29.52		29.57	54.34	7.78			356.03	468.74		
2	555.9936	PF 2	29.59	0.07	29.67	62.19	14.48			356.03	468.74		
2	555.9936	PF 3	29.73	0.21	29.86	80.93	35.51			356.03	468.74		
2	339.7166	PF 1	26.54		26.60	68.31	4.79	2.99		308.99	417.62		

2	339.7166	PF 2	26.60	0.06	26.68	80.90	7.57	6.91		308.99	417.62
2	339.7166	PF 3	26.73	0.19	26.83	115.30	14.87	20.64		308.99	417.62

Profile Output Table - Encroachment 2

Reach	River Sta	Profile	Prof Delta WS	Top Wdth Act	K Perc L	Enc Sta L	Dist Center L	Center Station	Dist Center R	Enc Sta R	K Perc R	Enc WD
			(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)		
2	3120.519	PF 1		8.39			353.67					
2	3120.519	PF 2	0.25	10.76			353.67					
2	3120.519	PF 3	0.74	15.41			353.67					
2	2686.898	PF 1		23.73			305.29					
2	2686.898	PF 2	0.12	28.50			305.29					
2	2686.898	PF 3	0.38	35.15			305.29					
2	2303.937	PF 1		27.66			294.92					
2	2303.937	PF 2	0.11	30.49			294.92					
2	2303.937	PF 3	0.35	36.88			294.92					
2	2022.379	PF 1		32.91			253.55					
2	2022.379	PF 2	0.10	40.27			253.55					
2	2022.379	PF 3	0.32	95.22			253.55					
2	1625.743	PF 1		28.10			164.41					
2	1625.743	PF 2	0.11	34.05			164.41					
2	1625.743	PF 3	0.37	89.75			164.41					
2	1243.868	PF 1		21.05			205.64					
2	1243.868	PF 2	0.14	27.06			205.64					
2	1243.868	PF 3	0.43	79.31			205.64					
2	1015.459	PF 1		48.67			310.34					
2	1015.459	PF 2	0.11	56.91			310.34					
2	1015.459	PF 3	0.31	80.17			310.34					
2	864.1274	PF 1		60.70			281.31					
2	864.1274	PF 2	0.06	87.02			281.31					
2	864.1274	PF 3	0.18	102.05			281.31					
2	555.9936	PF 1		54.34			412.38					
2	555.9936	PF 2	0.07	62.19			412.38					
2	555.9936	PF 3	0.21	80.93			412.38					
2	339.7166	PF 1		68.31			363.31					
2	339.7166	PF 2	0.06	80.90			363.31					
2	339.7166	PF 3	0.19	115.30			363.31					

Profile Output Table - Encroachment 3

Reach	River Sta	Profile	Top Wdth Act	Area	Vel Total	W.S. Elev	Base WS	Prof Delta WS
			(m)	(m2)	(m/s)	(m)	(m)	(m)
2	3120.519	PF 1	8.39	3.73	2.09	152.82	152.82	
2	3120.519	PF 2	10.76	6.12	2.36	153.07	152.82	0.25
2	3120.519	PF 3	15.41	12.55	2.83	153.56	152.82	0.74
2	2686.898	PF 1	23.73	5.22	1.49	92.81	92.81	
2	2686.898	PF 2	28.50	8.38	1.73	92.93	92.81	0.12
2	2686.898	PF 3	35.15	16.53	2.15	93.19	92.81	0.38
2	2303.937	PF 1	27.66	5.52	1.41	68.03	68.03	
2	2303.937	PF 2	30.49	8.62	1.68	68.14	68.03	0.11
2	2303.937	PF 3	36.88	16.70	2.13	68.38	68.03	0.35
2	2022.379	PF 1	32.91	5.82	1.34	56.81	56.81	
2	2022.379	PF 2	40.27	9.42	1.54	56.91	56.81	0.10
2	2022.379	PF 3	95.22	23.16	1.53	57.12	56.81	0.32
2	1625.743	PF 1	28.10	5.52	1.41	48.16	48.16	
2	1625.743	PF 2	34.05	8.92	1.62	48.27	48.16	0.11
2	1625.743	PF 3	89.75	22.87	1.55	48.53	48.16	0.37
2	1243.868	PF 1	21.05	5.02	1.55	40.87	40.87	

2	1243.868	PF 2	27.06	8.29	1.75	41.00	40.87	0.14
2	1243.868	PF 3	79.31	22.96	1.55	41.30	40.87	0.43
2	1015.459	PF 1	48.67	10.44	0.75	35.69	35.69	
2	1015.459	PF 2	56.91	16.21	0.89	35.80	35.69	0.11
2	1015.459	PF 3	80.17	29.97	1.18	35.99	35.69	0.31
2	864.1274	PF 1	60.70	7.17	1.08	34.63	34.63	
2	864.1274	PF 2	87.02	12.10	1.20	34.69	34.63	0.06
2	864.1274	PF 3	102.05	23.33	1.52	34.81	34.63	0.18
2	555.9936	PF 1	54.34	7.66	1.02	29.52	29.52	
2	555.9936	PF 2	62.19	11.77	1.23	29.59	29.52	0.07
2	555.9936	PF 3	80.93	21.77	1.63	29.73	29.52	0.21
2	339.7166	PF 1	68.31	7.79	1.00	26.54	26.54	
2	339.7166	PF 2	80.90	12.23	1.18	26.60	26.54	0.06
2	339.7166	PF 3	115.30	25.03	1.42	26.73	26.54	0.19

Profile Output Table - HEC-FDA

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)
2	3120.519	PF 1	7.78	158.39	152.82
2	3120.519	PF 2	14.48	158.39	153.07
2	3120.519	PF 3	35.51	158.39	153.56
2	2686.898	PF 1	7.78	101.81	92.81
2	2686.898	PF 2	14.48	101.81	92.93
2	2686.898	PF 3	35.51	101.81	93.19
2	2303.937	PF 1	7.78	74.29	68.03
2	2303.937	PF 2	14.48	74.29	68.14
2	2303.937	PF 3	35.51	74.29	68.38
2	2022.379	PF 1	7.78	56.96	56.81
2	2022.379	PF 2	14.48	56.96	56.91
2	2022.379	PF 3	35.51	56.96	57.12
2	1625.743	PF 1	7.78	47.77	48.16
2	1625.743	PF 2	14.48	47.77	48.27
2	1625.743	PF 3	35.51	47.77	48.53
2	1243.868	PF 1	7.78	40.39	40.87
2	1243.868	PF 2	14.48	40.39	41.00
2	1243.868	PF 3	35.51	40.39	41.30
2	1015.459	PF 1	7.78	37.09	35.69
2	1015.459	PF 2	14.48	37.09	35.80
2	1015.459	PF 3	35.51	37.09	35.99
2	864.1274	PF 1	7.78	34.85	34.63
2	864.1274	PF 2	14.48	34.85	34.69
2	864.1274	PF 3	35.51	34.85	34.81
2	555.9936	PF 1	7.78	29.81	29.52
2	555.9936	PF 2	14.48	29.81	29.59
2	555.9936	PF 3	35.51	29.81	29.73
2	339.7166	PF 1	7.78	26.30	26.54
2	339.7166	PF 2	14.48	26.30	26.60
2	339.7166	PF 3	35.51	26.30	26.73

Profile Output Table - Ice Cover

Reach	River Sta	Profile	W.S. Elev (m)	Ice Thick LOB (m)	Ice Thick Chan (m)	Ice Thick ROB (m)	Ice Vol Total (m3)	Ice Vol. LOB (m3)	Ice Vol. Chan (m3)	Ice Vol. ROB (m3)	Mann Wtd Left (m)	Mann Wtd Chnl (m)	Mann Wtd Rght (m)	Ice WS Err (m)	Ice Err (m)
2	3120.519	PF 1	152.82												0.03
2	3120.519	PF 2	153.07												0.03
2	3120.519	PF 3	153.56												0.03

2	2686.898	PF 1	92.81						0.03		
2	2686.898	PF 2	92.93						0.03		
2	2686.898	PF 3	93.19						0.03		
2	2303.937	PF 1	68.03						0.03		
2	2303.937	PF 2	68.14						0.03		
2	2303.937	PF 3	68.38						0.03		
2	2022.379	PF 1	56.81						0.03		
2	2022.379	PF 2	56.91						0.03		
2	2022.379	PF 3	57.12						0.03	0.03	
2	1625.743	PF 1	48.16							0.03	
2	1625.743	PF 2	48.27							0.03	
2	1625.743	PF 3	48.53							0.03	0.03
2	1243.868	PF 1	40.87							0.03	
2	1243.868	PF 2	41.00							0.03	
2	1243.868	PF 3	41.30						0.03	0.03	
2	1015.459	PF 1	35.69						0.03		
2	1015.459	PF 2	35.80						0.03		
2	1015.459	PF 3	35.99						0.03		
2	864.1274	PF 1	34.63						0.03		
2	864.1274	PF 2	34.69						0.03		
2	864.1274	PF 3	34.81						0.03		
2	555.9936	PF 1	29.52						0.03		
2	555.9936	PF 2	29.59						0.03		
2	555.9936	PF 3	29.73						0.03		
2	339.7166	PF 1	26.54						0.03	0.03	
2	339.7166	PF 2	26.60						0.03	0.03	
2	339.7166	PF 3	26.73						0.03	0.03	

Profile Output Table - Junctions

Reach	River Sta	Profile	W.S. Elev	E.G. Elev	Q Total
		(m)	(m)	(m3/s)	

Profile Output Table - Storage Area

Storage Area	Profile	W.S. Elev	SA Min El	Inflow	Outflow	Net Flux	SA Area	SA Volume
	(m)	(m)	(m3/s)	(m3/s)	(m3/s)	(1000 m2)	(1000 m3)	

Profile Output Table - Conn with Culverts

Connection	Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
	(m)	(m)	(m)	(m)	(m)	(m3/s)	(m3/s)	(m)	(m/s)	(m/s)	

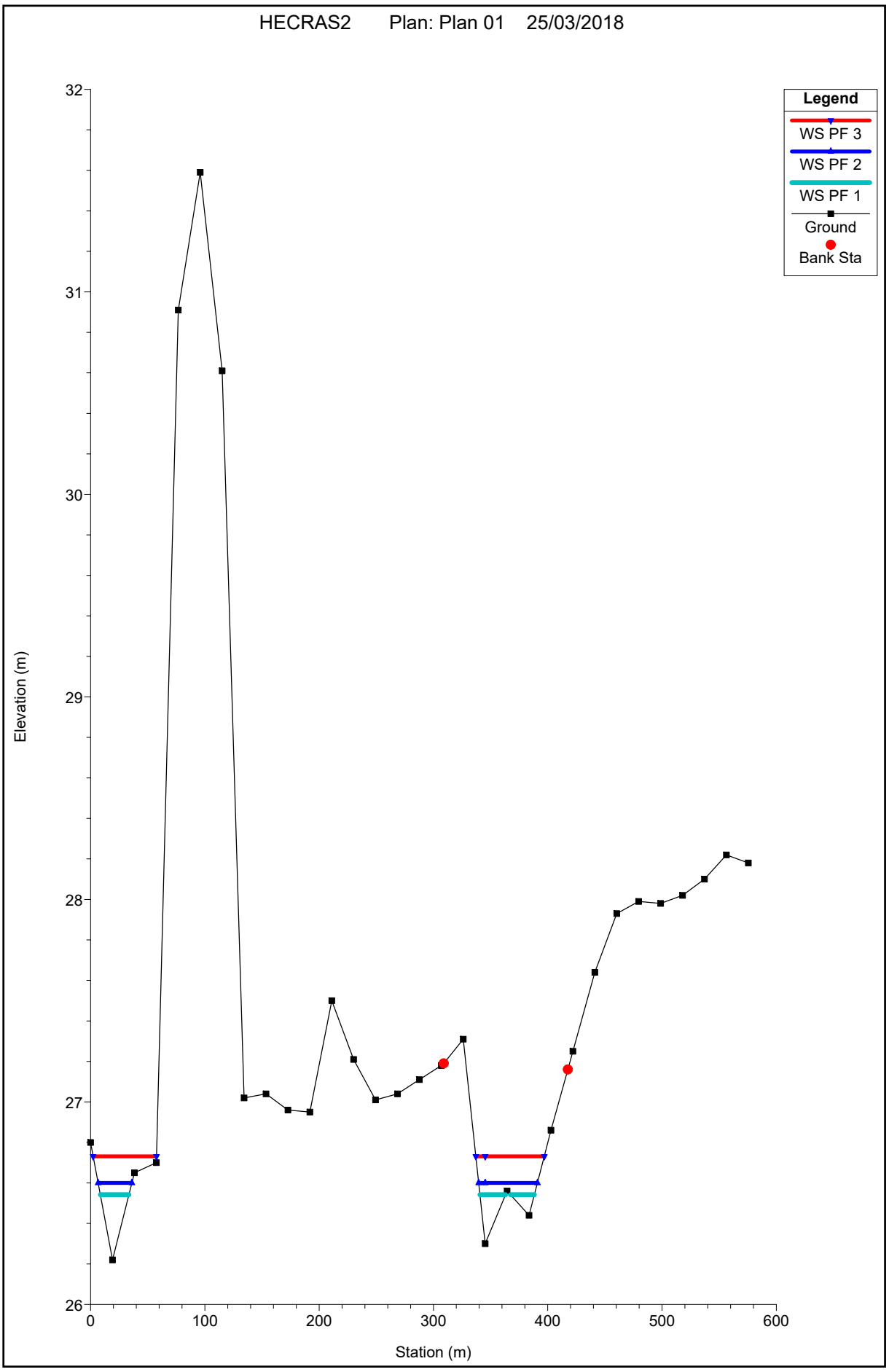
Profile Output Table - Conn with Weir and Gates

Connection	Profile	E.G. Elev	W.S. Elev	Q Total	Q Weir	Q Gates	Weir Submerg	Min El Weir Flow
	(m)	(m)	(m3/s)	(m3/s)	(m3/s)		(m)	

Profile Output Table - Pump Stations

Pump Stations	Profile	Q Pump Station	WS Inlet	WS Outlet	Pumping Head
		(m3/s)	(m)	(m)	(m)

SECCIONES HEC-RAS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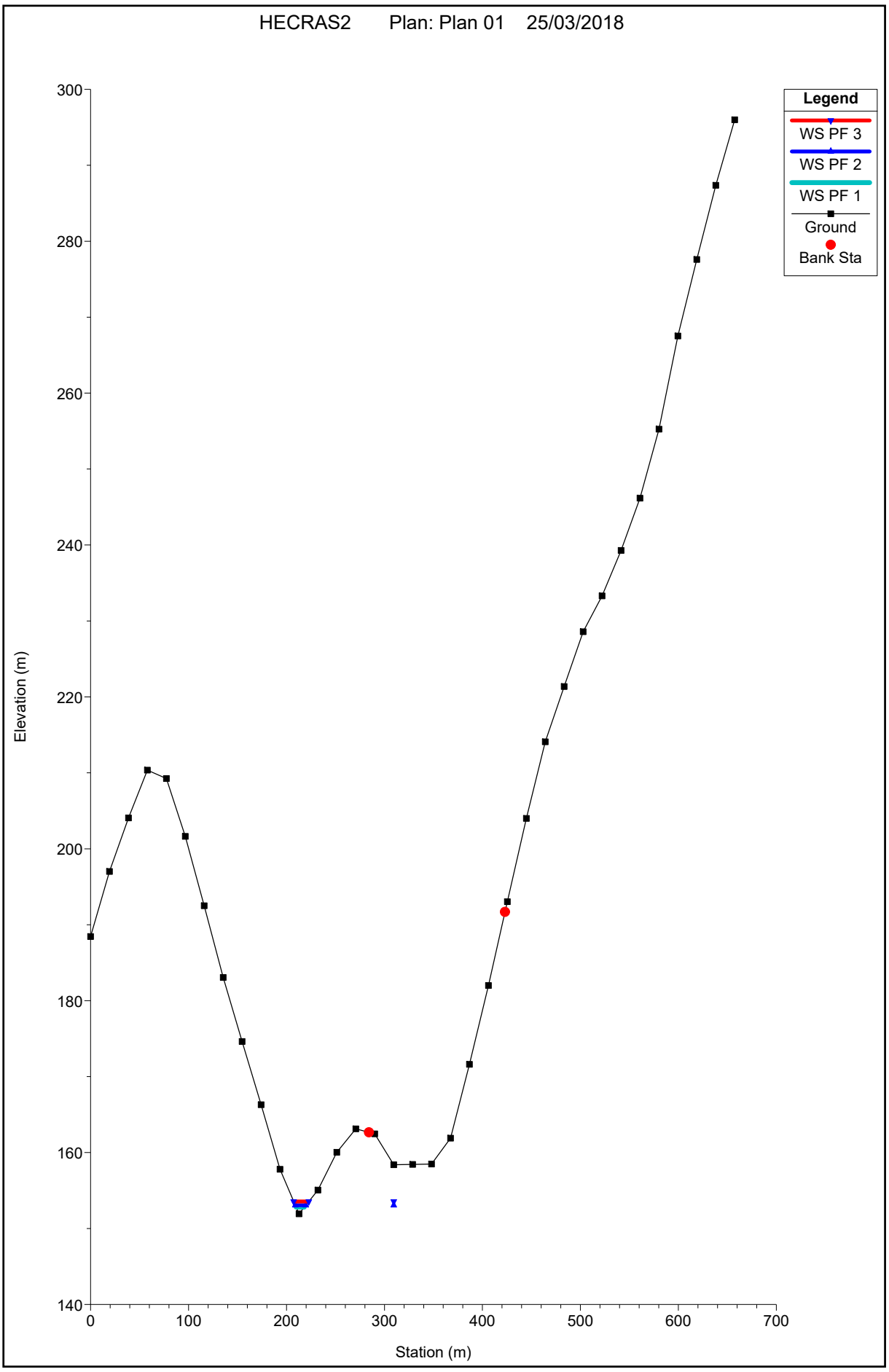
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Ground
Bank Sta
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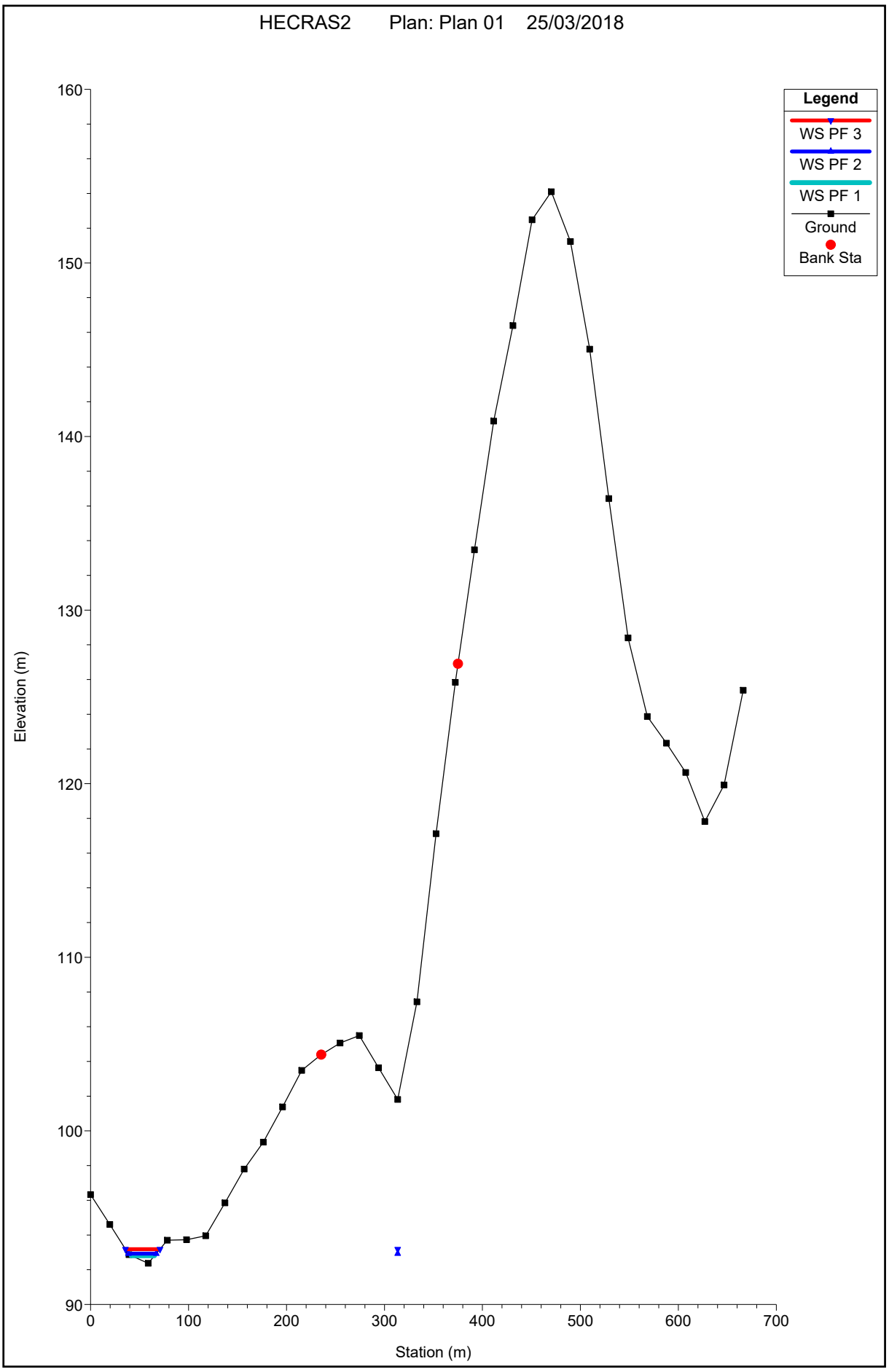
700
Station (m)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WS PF 2
WS PF 1
Ground
Bank Sta
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100
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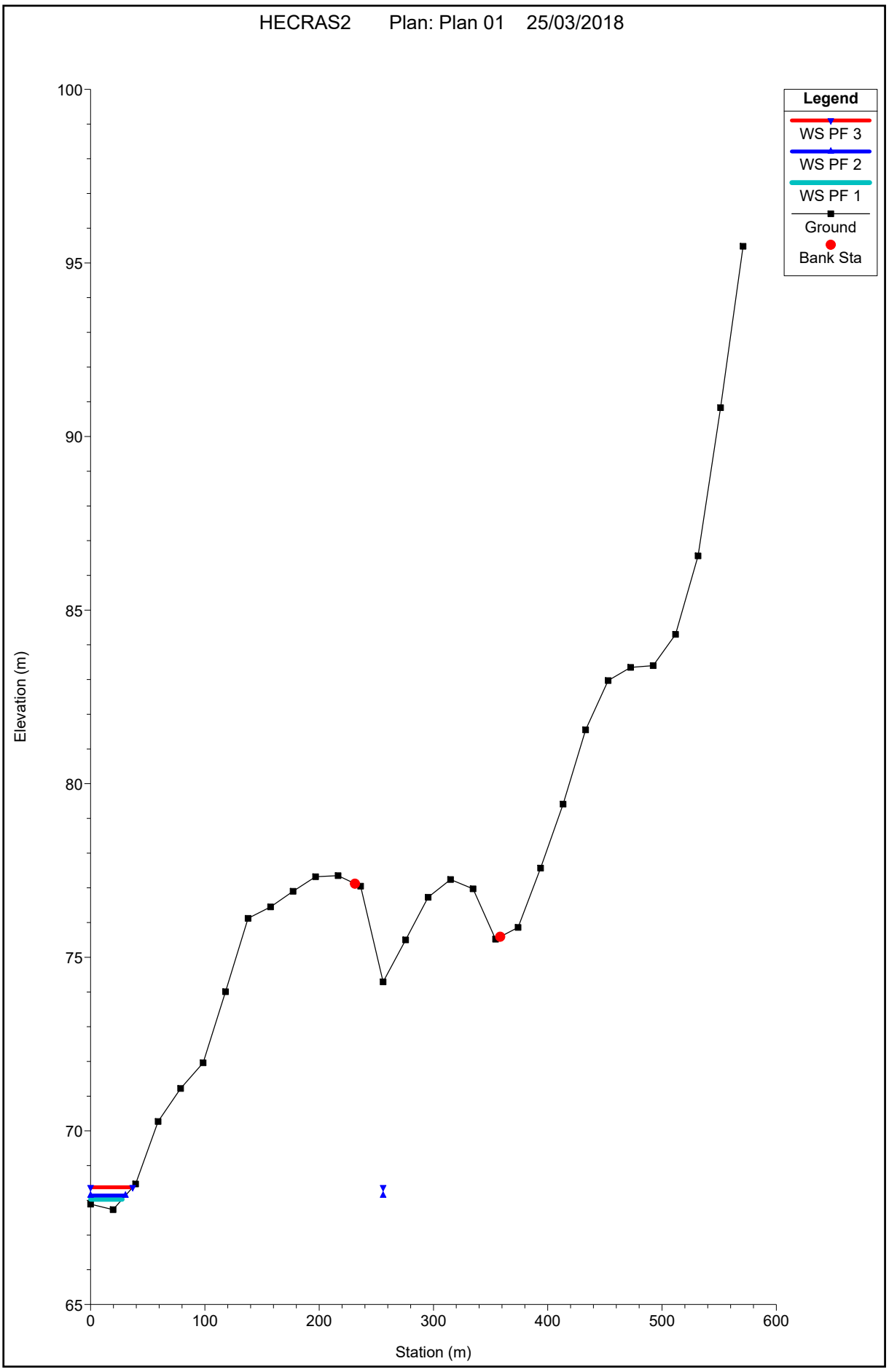
100
200
300
400
500
600
700
Station (m)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WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
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500
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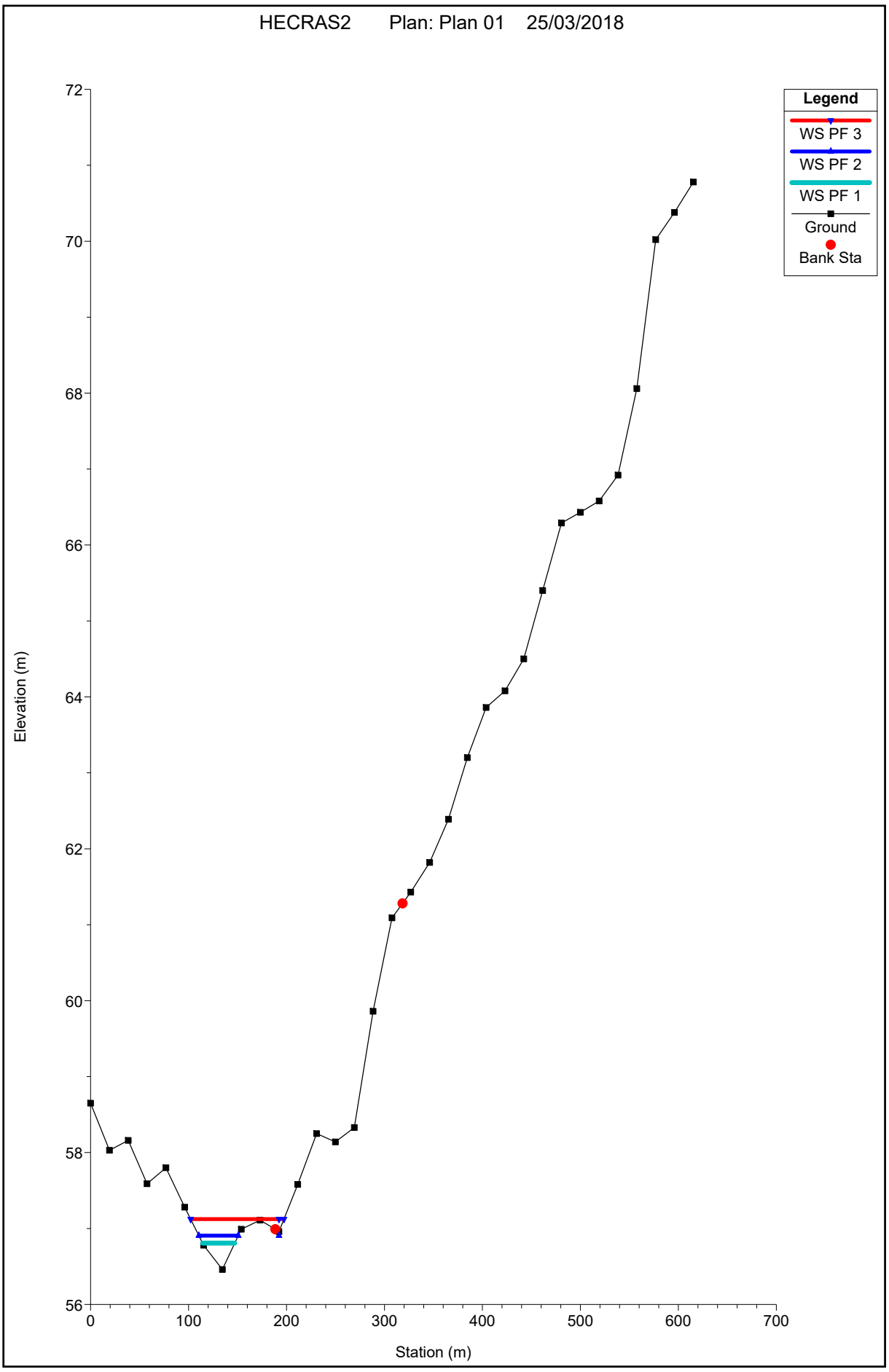
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WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
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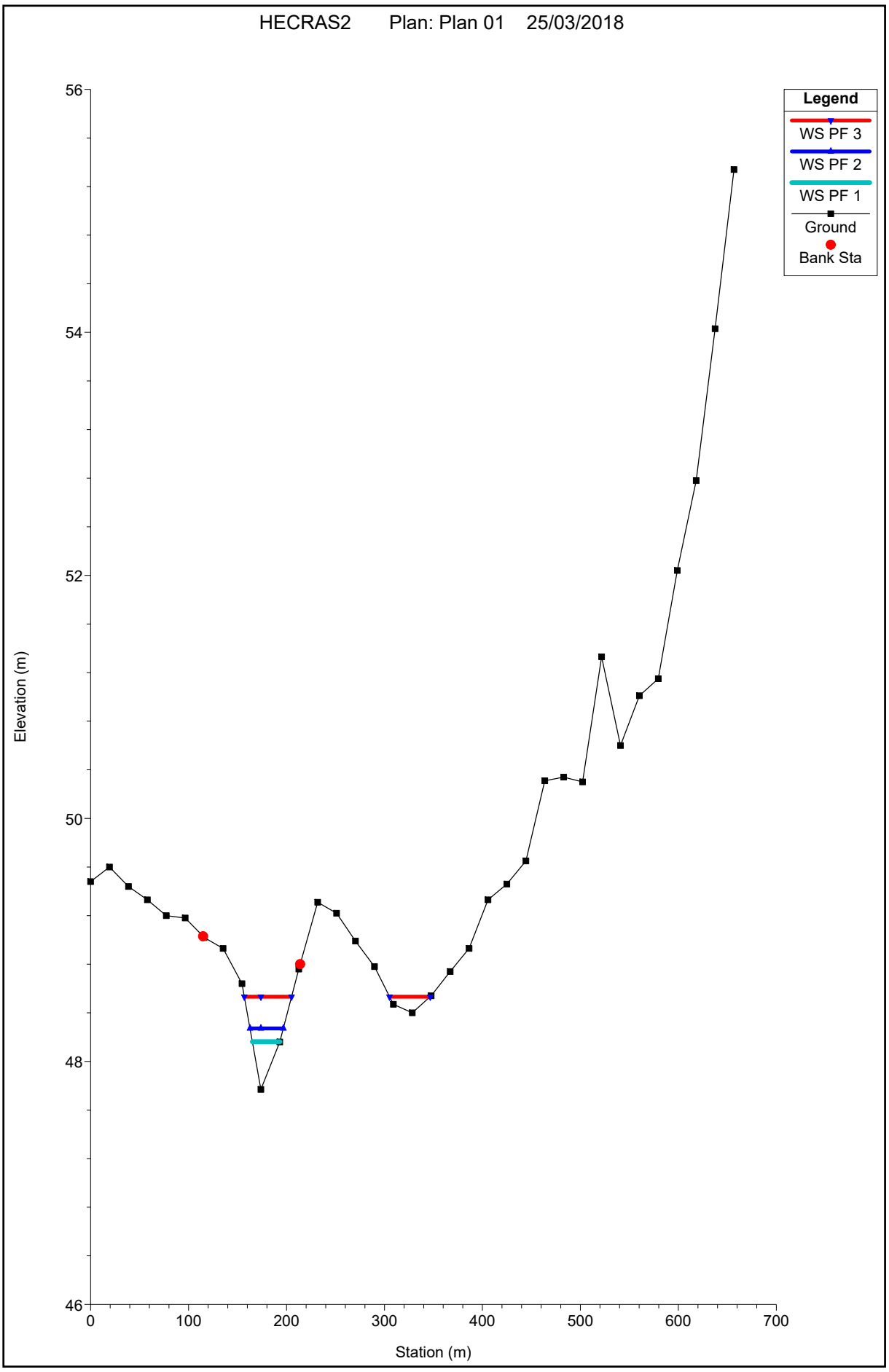
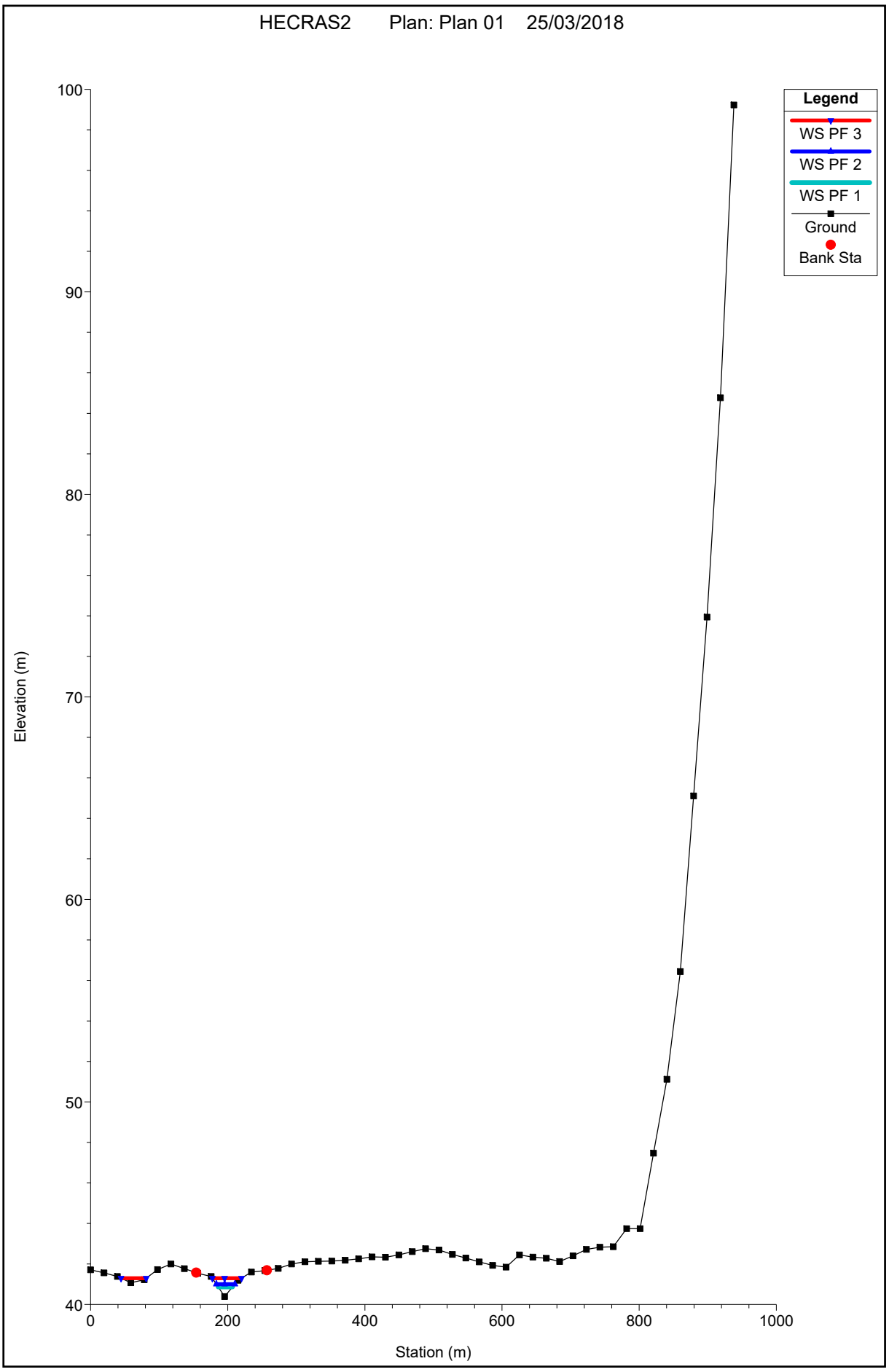
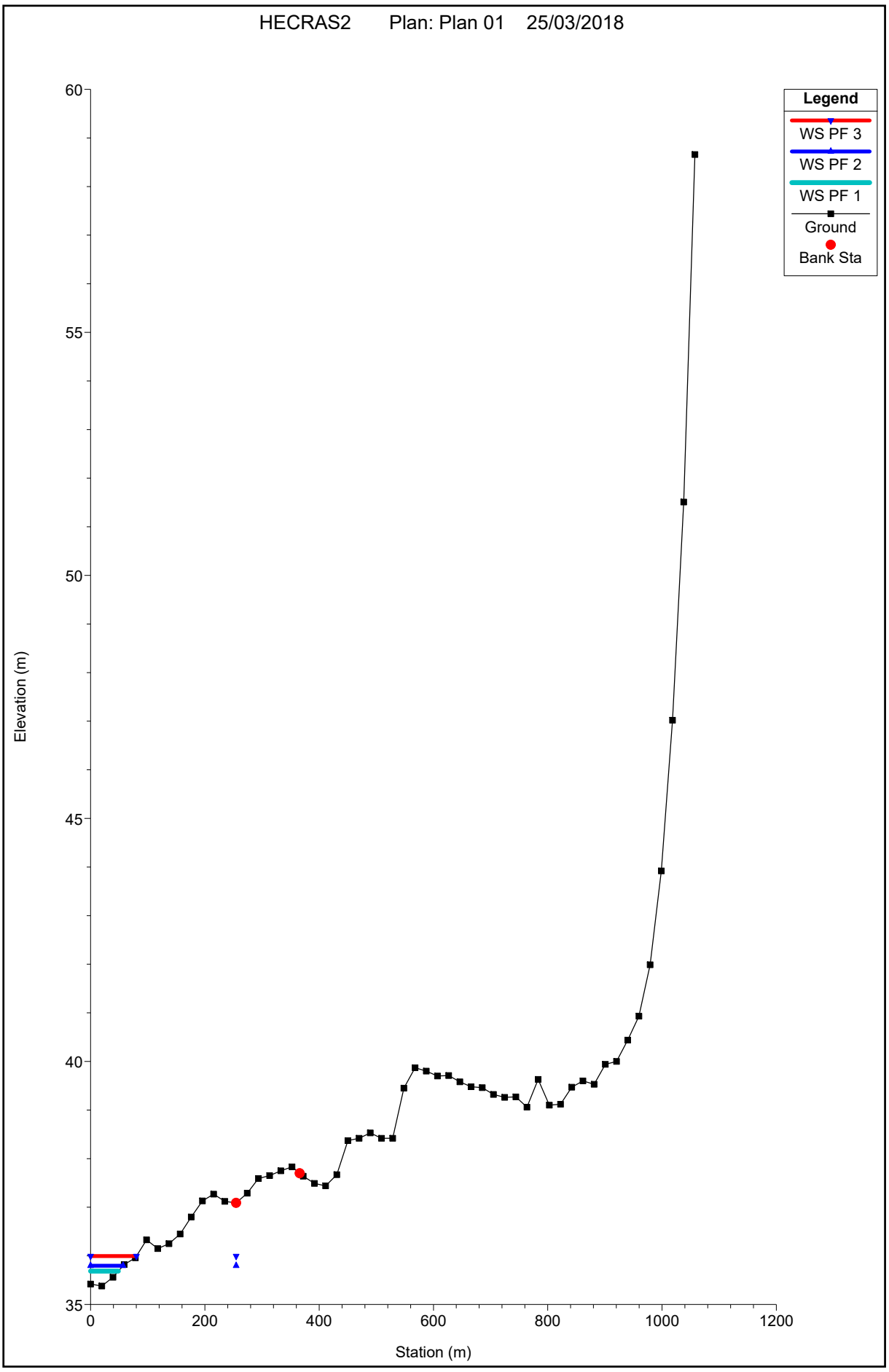
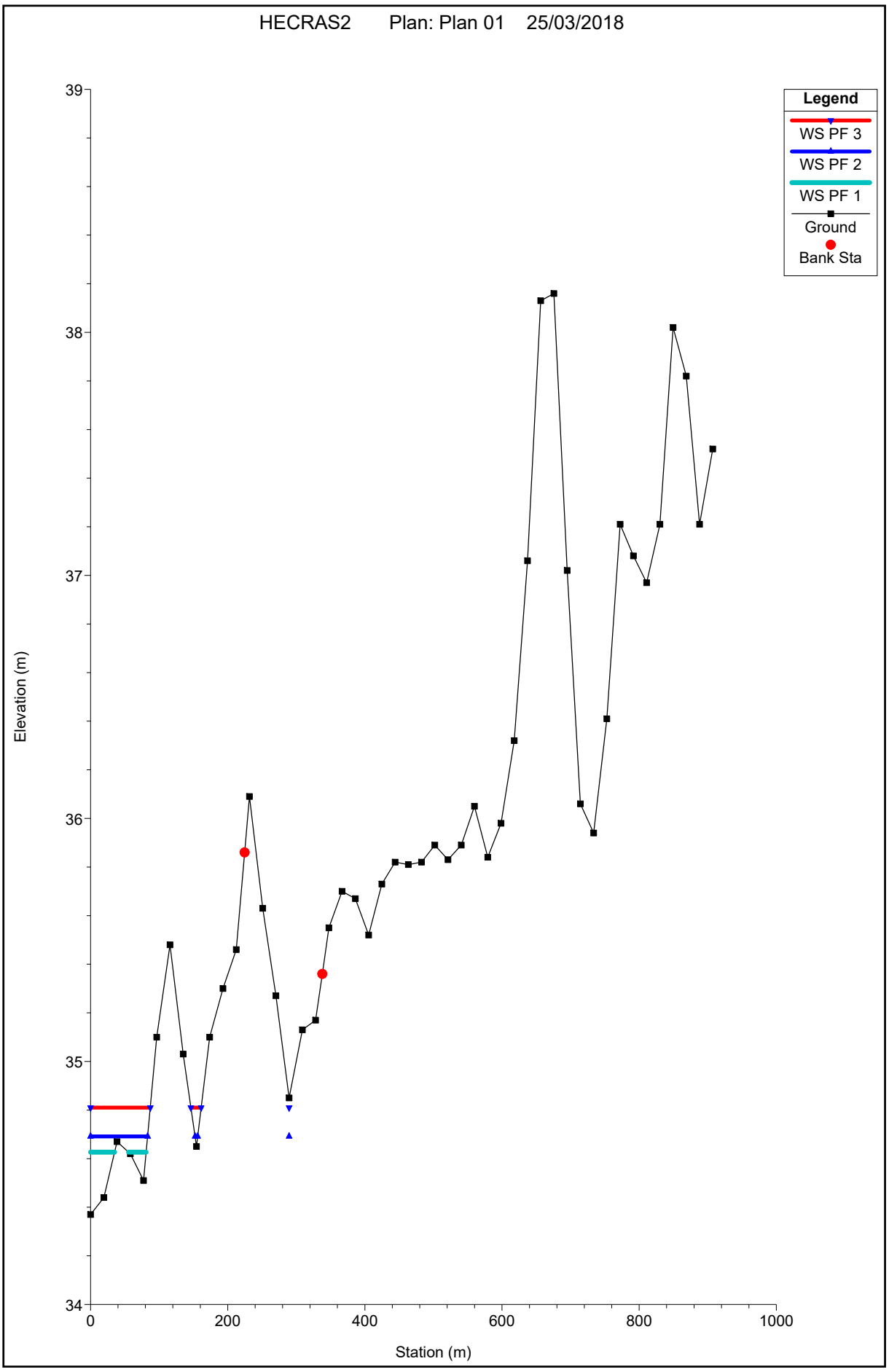
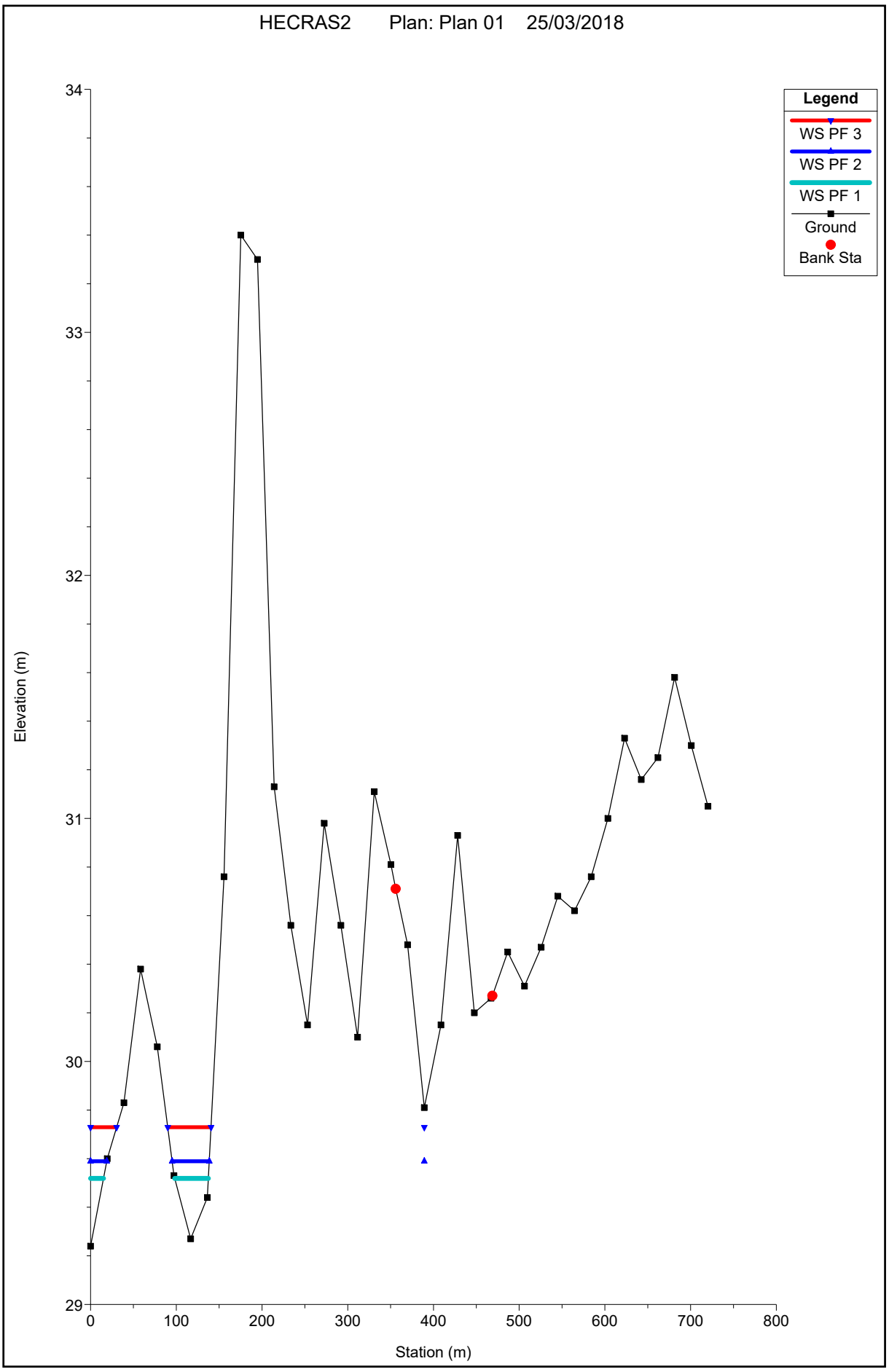
66
64
62
60
58
56
0
100
200
300
400
500
600
700
Station (m)


HECRAS2 Plan: Plan 01 25/03/2018
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
56
54
52
50
48
46
0
100
200
300
400
500
600
700
Station (m)


HECRAS2 Plan: Plan 01 25/03/2018
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
100
90
80
70
60
50
40
0
200
400
600
800
1000
Station (m)

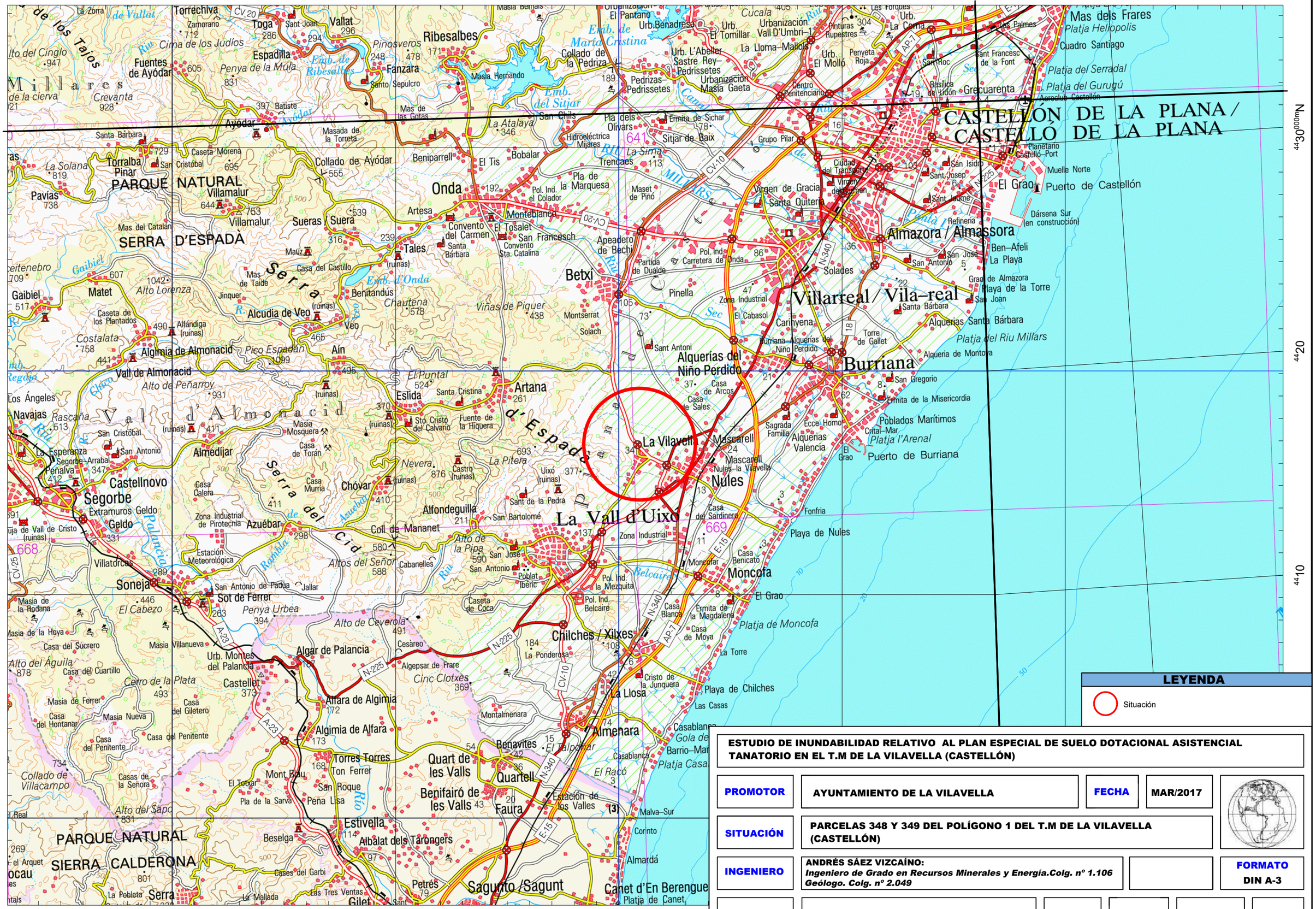

HECRAS2 Plan: Plan 01 25/03/2018
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
60
55
50
45
40
35
0
200
400
600
800
1000
1200
Station (m)


HECRAS2 Plan: Plan 01 25/03/2018
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
39
38
37
36
35
34
0
200
400
600
800
1000


HECRAS2 Plan: Plan 01 25/03/2018
Legend
WS PF 3
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
34
33
32
31
30
29
0
100
200
300
400
500
600
700
800

DOCUMENTO Nº 2.-PLANOS

INDICE

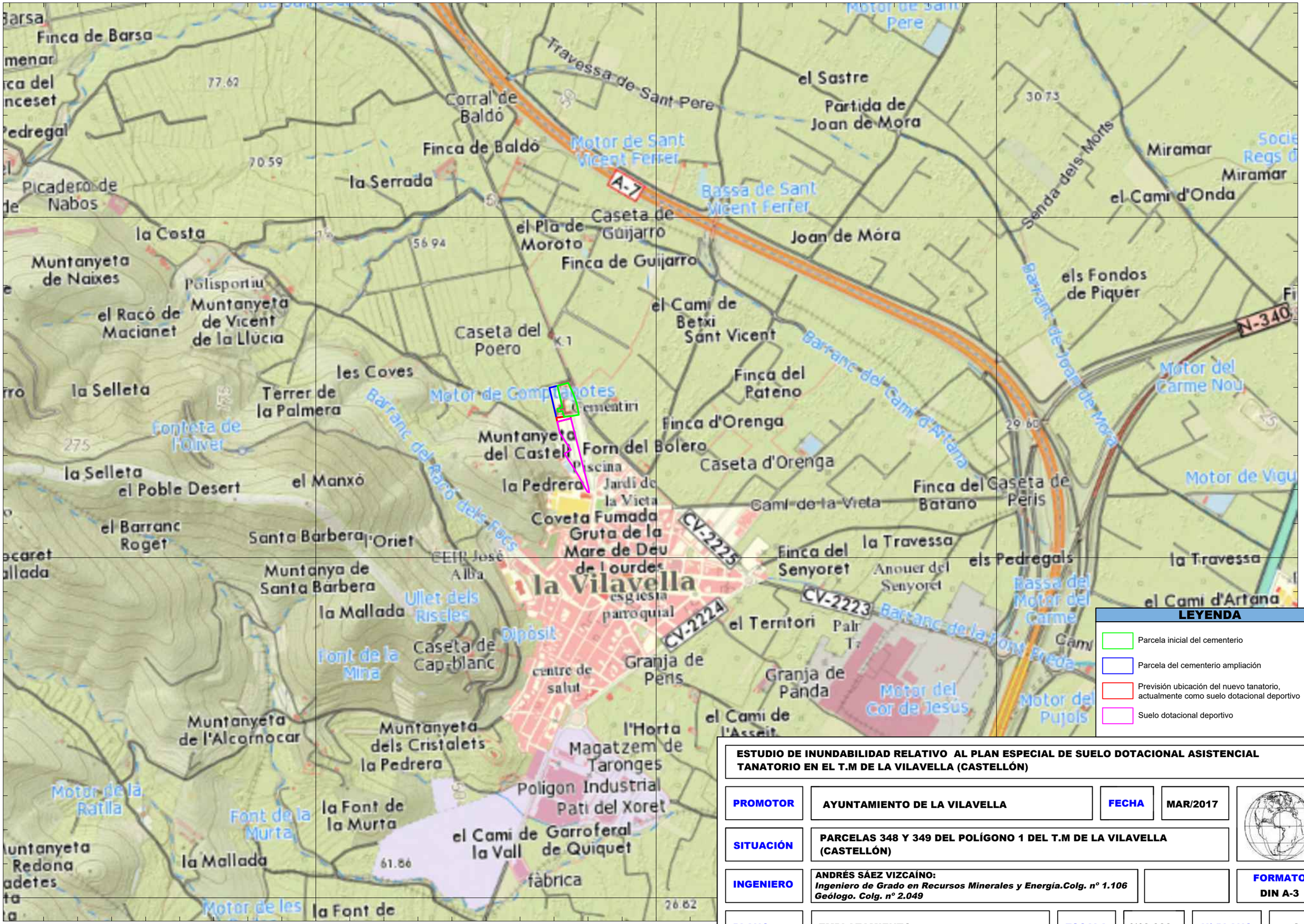


LEYENDA

Situación

ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

PROMOTOR	AYUNTAMIENTO DE LA VILAVELLA	**FECHA**	MAR/2017
SITUACIÓN	PARCELAS 348 Y 349 DEL POLÍGONO 1 DEL T.M DE LA VILAVELLA (CASTELLÓN)		
INGENIERO	**ANDRÉS SÁEZ VIZCAÍNO:** ***Ingeniero de Grado en Recursos Minerales y Energía.Colg. nº 1.106*** ***Geólogo. Colg. nº 2.049***		**FORMATO** DIN A-3
PLANO	SITUACIÓN	**ESCALA** 1/150.000	**Nº PLANO** 1



LEYENDA

- Parcela inicial del cementerio
- Parcela del cementerio ampliación
- Previsión ubicación del nuevo tanatorio, actualmente como suelo dotacional deportivo
- Suelo dotacional deportivo

ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

PROMOTOR	**AYUNTAMIENTO DE LA VILAVELLA**	**FECHA**	**MAR/2017**
SITUACIÓN	**PARCELAS 348 Y 349 DEL POLÍGONO 1 DEL T.M DE LA VILAVELLA (CASTELLÓN)**		
INGENIERO	**ANDRÉS SÁEZ VIZCAÍNO:** ***Ingeniero de Grado en Recursos Minerales y Energía.Colg. nº 1.106*** ***Geólogo. Colg. nº 2.049***		**FORMATO** **DIN A-3**
PLANO	**EMPLAZAMIENTO**	**ESCALA** **1/10.000**	**Nº PLANO** **2**

Sistema de referencia ETRS89 UTM H30

$^{7}40^{000m}E$

$^{7}41^{000m}E$

$^{441}7^{000m}N$

$^{441}6^{000m}N$

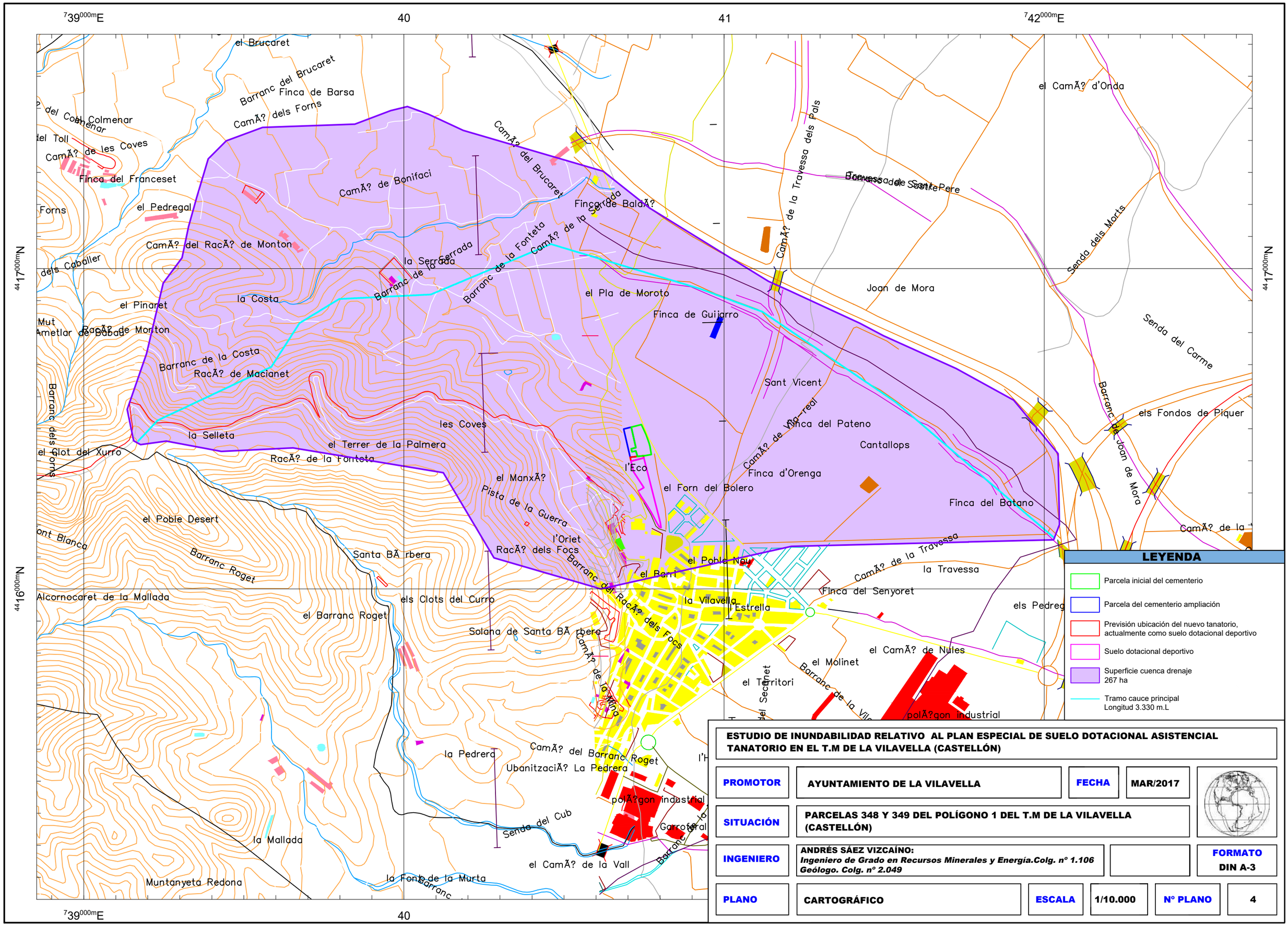
LEYENDA

- Parcela inicial del cementerio
- Parcela del cementerio ampliación
- Previsión ubicación del nuevo tanatorio, actualmente como suelo dotacional deportivo
- Suelo dotacional deportivo

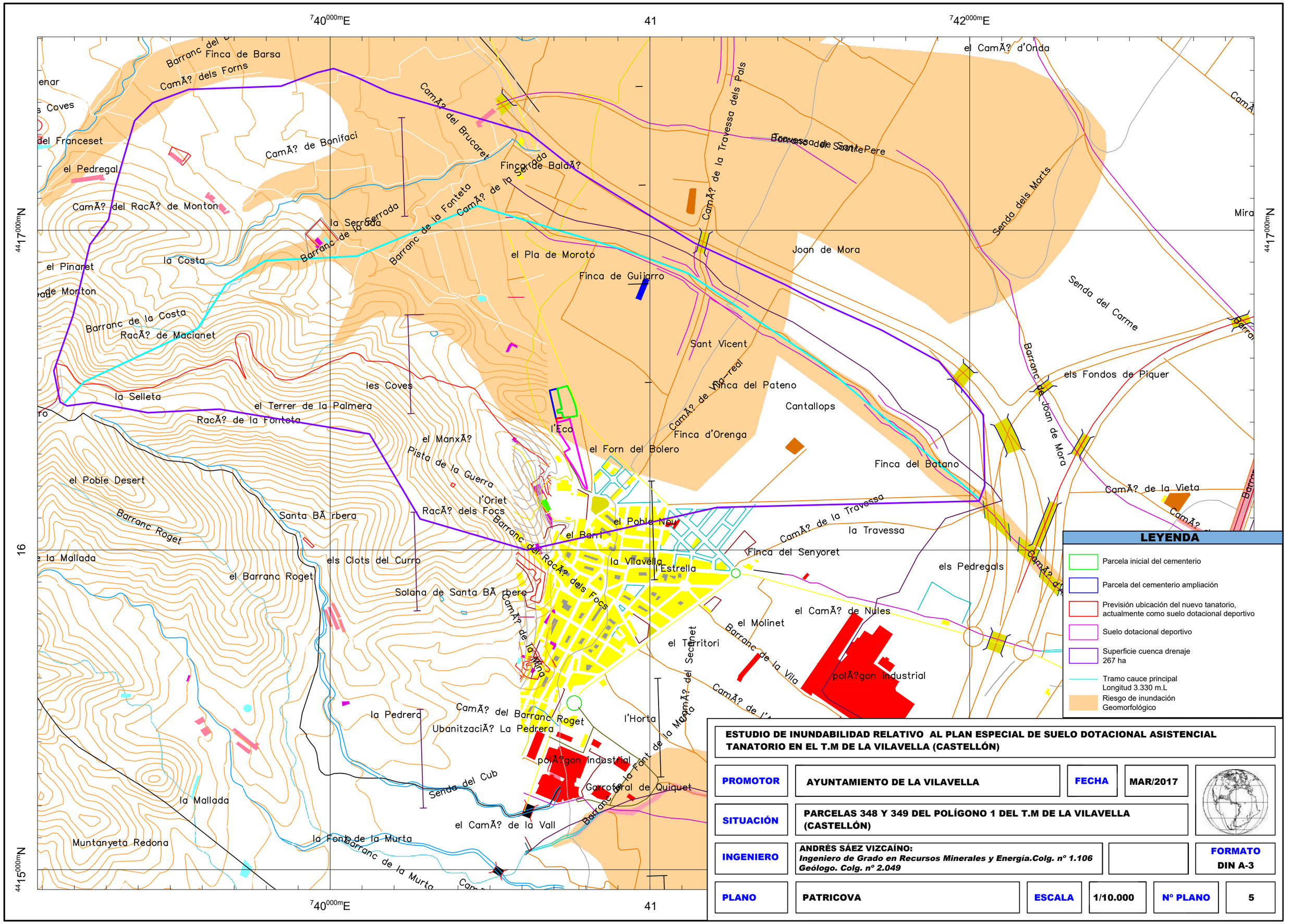
ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

PROMOTOR	**AYUNTAMIENTO DE LA VILAVELLA**	**FECHA**	**MAR/2017**
SITUACIÓN	**PARCELAS 348 Y 349 DEL POLÍGONO 1 DEL T.M DE LA VILAVELLA (CASTELLÓN)**		
INGENIERO	**ANDRÉS SÁEZ VIZCAÍNO:** ***Ingeniero de Grado en Recursos Minerales y Energía.Colg. nº 1.106*** ***Geólogo. Colg. nº 2.049***		**FORMATO** **DIN A-3**
PLANO	**ORTOCATASTRAL**	**ESCALA** **1/5.000**	**Nº PLANO** **3**

Sistema de referencia ETRS89 UTM H30



Sistema de referencia ETRS89 UTM H30



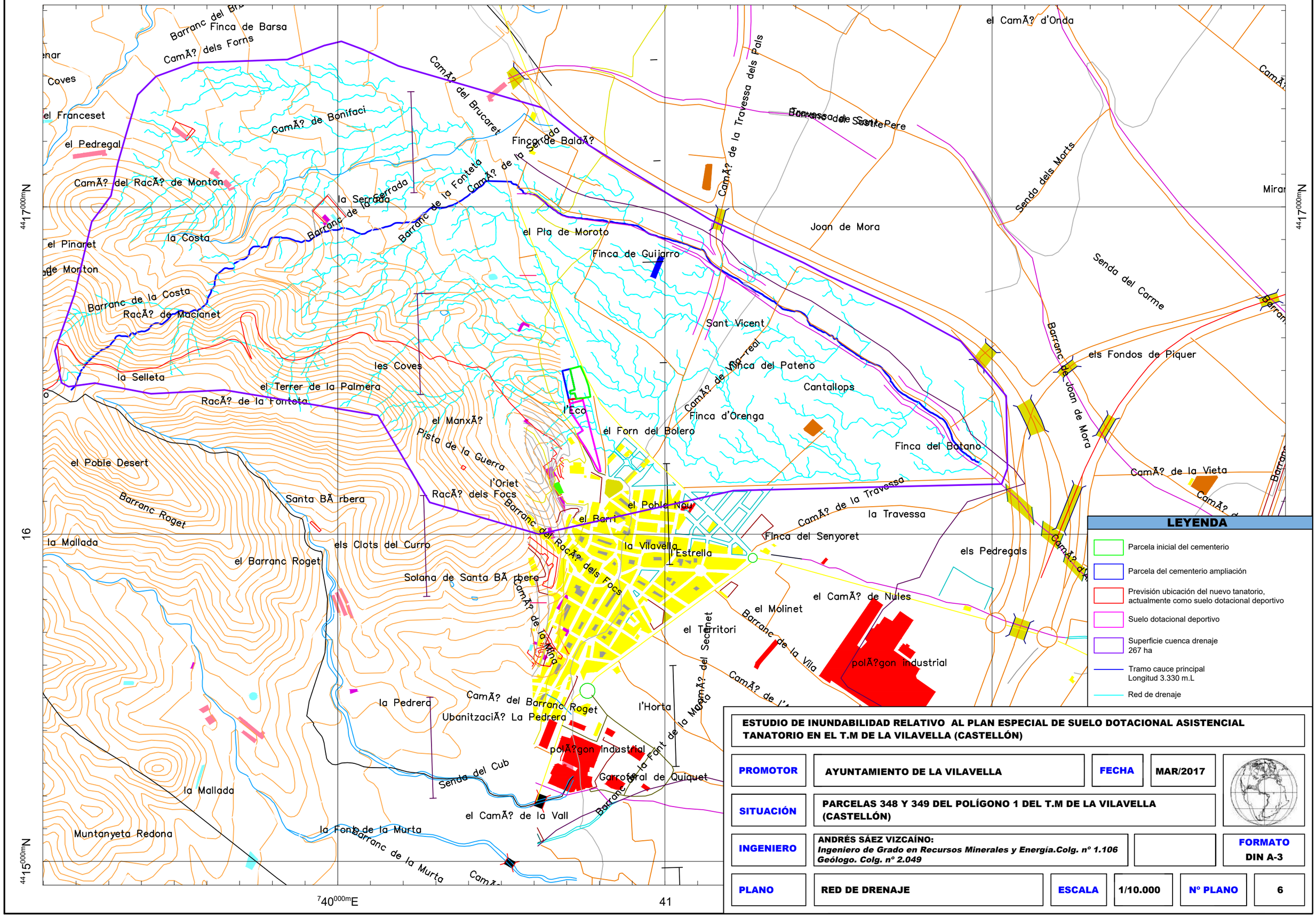
LEYENDA

- Parcela inicial del cementerio
- Parcela del cementerio ampliación
- Previsión ubicación del nuevo tanatorio, actualmente como suelo dotacional deportivo
- Suelo dotacional deportivo
- Superficie cuenca drenaje 267 ha
- Tramo cauce principal Longitud 3.330 m.L
- Riesgo de inundación Geomorfológico

ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

PROMOTOR	**AYUNTAMIENTO DE LA VILAVELLA**	**FECHA**	**MAR/2017**
SITUACIÓN	**PARCELAS 348 Y 349 DEL POLÍGONO 1 DEL T.M DE LA VILAVELLA (CASTELLÓN)**		
INGENIERO	**ANDRÉS SÁEZ VIZCAÍNO:** ***Ingeniero de Grado en Recursos Minerales y Energía.Colg. nº 1.106 Geólogo. Colg. nº 2.049***		**FORMATO** **DIN A-3**
PLANO	**PATRICOVA**	**ESCALA** **1/10.000**	**Nº PLANO** **5**

Sistema de referencia ETRS89 UTM H30



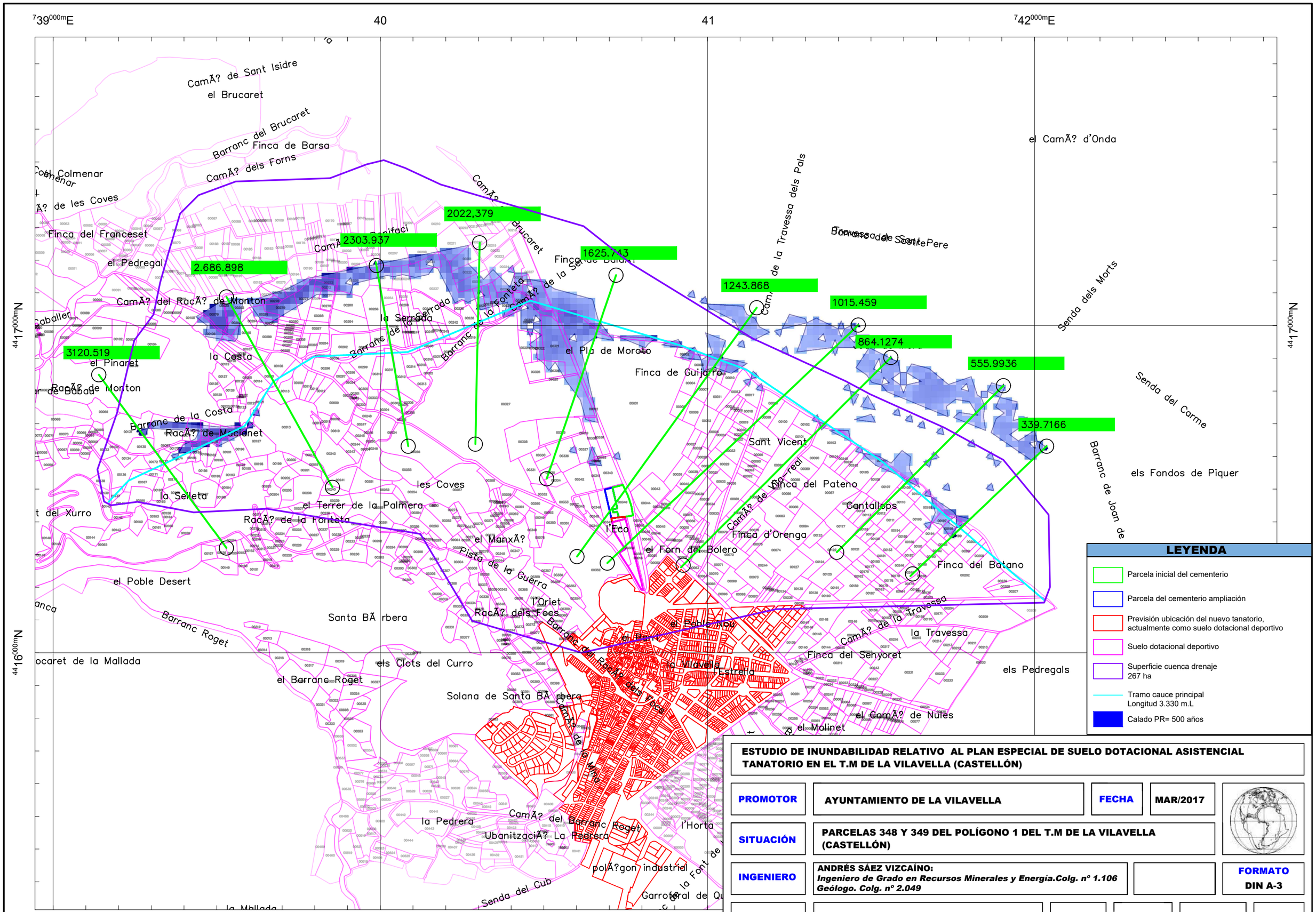
LEYENDA

- Parcela inicial del cementerio
- Parcela del cementerio ampliación
- Previsión ubicación del nuevo tanatorio, actualmente como suelo dotacional deportivo
- Suelo dotacional deportivo
- Superficie cuenca drenaje 267 ha
- Tramo cauce principal Longitud 3.330 m.L
- Red de drenaje

ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

PROMOTOR	**AYUNTAMIENTO DE LA VILAVELLA**	**FECHA**	**MAR/2017**
SITUACIÓN	**PARCELAS 348 Y 349 DEL POLÍGONO 1 DEL T.M DE LA VILAVELLA (CASTELLÓN)**		
INGENIERO	**ANDRÉS SÁEZ VIZCAÍNO:** ***Ingeniero de Grado en Recursos Minerales y Energía.Colg. nº 1.106*** ***Geólogo. Colg. nº 2.049***		**FORMATO** **DIN A-3**
PLANO	**RED DE DRENAJE**	**ESCALA** **1/10.000**	**Nº PLANO** **6**

Sistema de referencia ETRS89 UTM H30



ESTUDIO DE INUNDABILIDAD RELATIVO AL PLAN ESPECIAL DE SUELO DOTACIONAL ASISTENCIAL TANATORIO EN EL T.M DE LA VILAVELLA (CASTELLÓN)

PROMOTOR	**AYUNTAMIENTO DE LA VILAVELLA**	**FECHA**	**MAR/2017**
SITUACIÓN	**PARCELAS 348 Y 349 DEL POLÍGONO 1 DEL T.M DE LA VILAVELLA (CASTELLÓN)**		
INGENIERO	**ANDRÉS SÁEZ VIZCAÍNO:** ***Ingeniero de Grado en Recursos Minerales y Energía.Colg. nº 1.106 Geólogo. Colg. nº 2.049***		**FORMATO** **DIN A-3**
PLANO	**PERFILES Y CALADO PR= 500 AÑOS**	**ESCALA** **1/10.000**	**Nº PLANO** **7**

Sistema de referencia ETRS89 UTM H30