

## 4.11 NPA10 - North West Sector (A1067-NNDR)

The cost mechanism for NPA10 is shown in Table 4-11 and is summarised below with a plan of the related estimated infrastructure, flood risk and environmental constraints shown in Figure 4-11, along with relevant traffic lights where appropriate.

### Wastewater

- Three options for the provision of wastewater treatment are Whitlingham WWTW, Wymondham WWTW and a new WWTW






### Water Supply

- Water would be supplied from Heigham WTW

### Water Resources

- Additional water resources are from connections to Thorpe St Andrew BH and Colney BH, GOGDS, River Wensum reuse and off line storage

### Flood Risk

- The area has been assigned a green traffic light as less than 10% of the PGA is within Flood Zone 2 or 3. 
- Flood risk from the PGA has been assigned the following traffic lights:
  - From Whitlingham WWTW – amber (discharges to tidal reach of River Yare); 
  - From Wymondham WWTW– green (discharges into River Tiffey) 
  - From a new WWTW - amber (discharges to tributary of River Wensum); 
- SUDS has been assigned a green traffic light (good SUDS suitability) 

### Environment






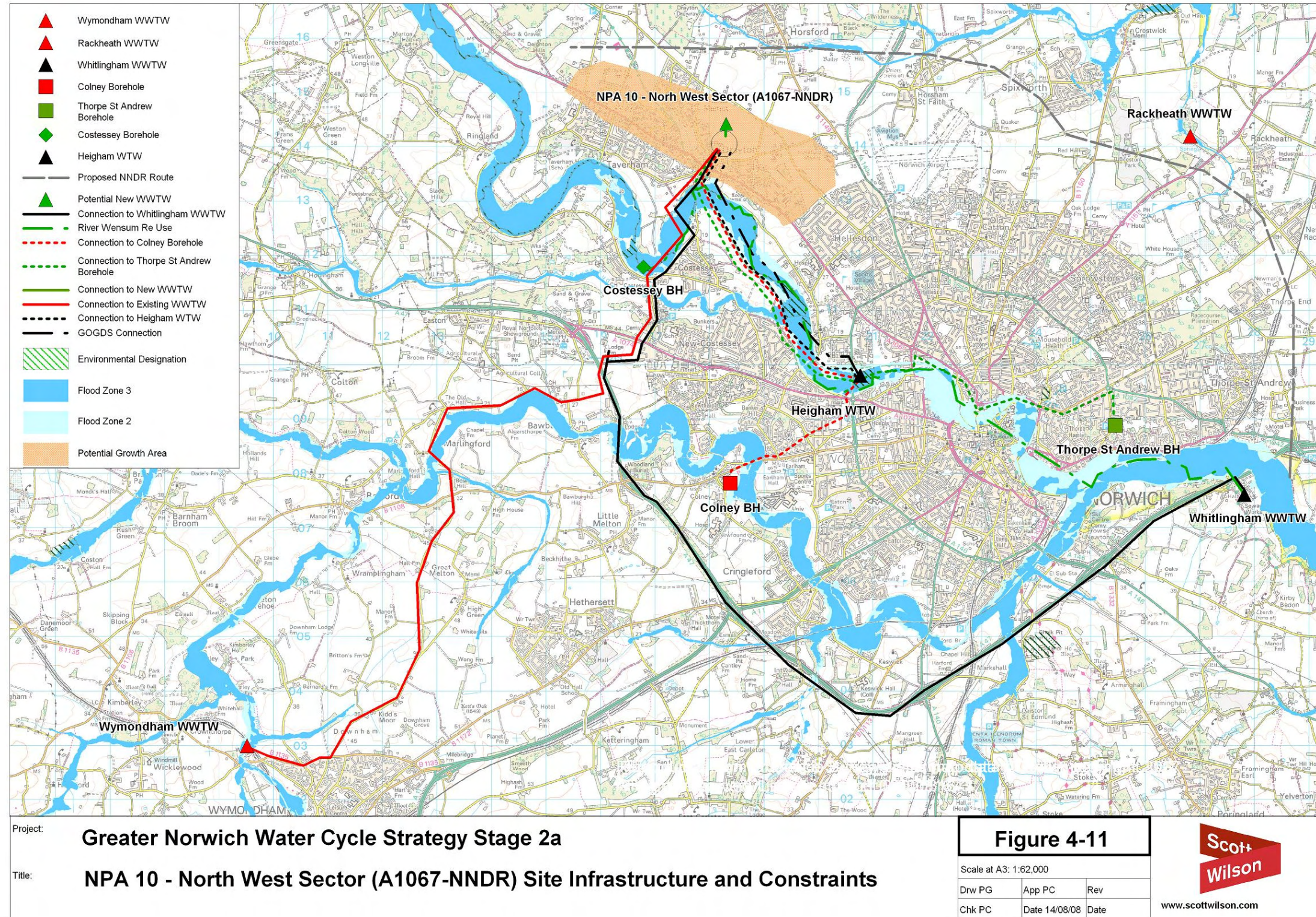
- Conservation designation has been assigned the following traffic lights:
  - From Whitlingham WWTW - amber (no conservation designated areas within the PGA but discharge into the River Yare would flow through a designated SAC site) 
  - From Wymondham WWTW - amber (no conservation designated areas within the PGA but discharge into River Tiffey would flow through an SAC site further downstream). 
  - From a new WWTW - amber (no conservation designated areas within the PGA but discharge into River Wensum would flow through an SAC site further downstream). 
- The PGA has been assigned a red traffic light in relation to groundwater vulnerability. 
- The PGA has been assigned a red traffic light in relation Source Protection Zone requirements. 

Table 4-11: NPA10 total summary costs

Calculations										
Job Title							Date		Section	Sheet 1 of 1
Norwich Water Cycle Study - Costing Calcs							01/09/2008		Job no. D118607	Project no.
Element		NPA10		Suffix		Orig		1		
Originator	Checked	Revision	Date	Check						
PC	ND						14/08/2008	PM		
<b>Wastewater</b>										
<b>Whitlingham</b>										
	Dist (m)	PDS	1,000	5,000	10,000	15,000	20,000			
Trunk Sewer - Rising			-	-	-	-	-			
Trunk Sewer - Gravity	16,770		6,300,000	8,800,000	10,700,000	11,500,000	11,500,000			
Pumping Stations			-	-	-	-	-			
New WWTW (vol)			-	-	-	-	-			
New WWTW (nut)			200,000	700,000	1,400,000	2,000,000	2,700,000			
<b>Total Costs (£)</b>			<b>6,500,000</b>	<b>9,500,000</b>	<b>12,100,000</b>	<b>13,500,000</b>	<b>14,200,000</b>			
<b>Upgrade Existing Wymondham</b>										
	Dist (m)									
Existing Headroom		4000	(3,000)	1,000	6,000	11,000	16,000			
Trunk Sewer - Rising			-	-	-	-	-			
Trunk Sewer - Gravity	18,000		6,800,000	9,500,000	11,500,000	12,300,000	12,300,000			
Pumping Stations			-	-	-	-	-			
New WWTW (vol)			-	2,700,000	10,800,000	16,400,000	21,700,000			
New WWTW (nut)			200,000	700,000	1,400,000	2,000,000	2,700,000			
<b>Total Costs (£)</b>			<b>7,000,000</b>	<b>12,900,000</b>	<b>23,700,000</b>	<b>30,700,000</b>	<b>36,700,000</b>			
<b>New WWTW</b>										
	Dist (m)									
Trunk Sewer - Rising			-	-	-	-	-			
Trunk Sewer - Gravity			-	-	-	-	-			
Pumping Stations			-	-	-	-	-			
New WWTW (vol)			3,300,000	13,500,000	18,000,000	22,300,000	27,100,000			
New WWTW (nut)			200,000	700,000	1,400,000	2,000,000	2,700,000			
<b>Total Costs (£)</b>			<b>3,500,000</b>	<b>14,200,000</b>	<b>19,400,000</b>	<b>24,300,000</b>	<b>29,800,000</b>			
<b>Water Supply</b>										
<b>Heigham</b>										
	Dist (m)	PDS	1,000	5,000	10,000	15,000	20,000			
Water Main	5,750		1,400,000	1,700,000	2,100,000	2,400,000	2,800,000			
Pumping Stations			700,000	1,100,000	1,300,000	1,500,000	1,700,000			
<b>Total Costs (£)</b>			<b>2,100,000</b>	<b>2,800,000</b>	<b>3,400,000</b>	<b>3,900,000</b>	<b>4,500,000</b>			
<b>Maximise Boreholes</b>										
	Dist (m)	PDS	1,000	5,000	10,000	15,000	20,000			
Pipework from Thorpe St A	11,750		2,700,000	3,300,000	4,200,000	4,900,000	5,600,000			
Pumping Stations			1,400,000	2,200,000	2,700,000	3,100,000	3,400,000			
Pipework from Colney	9,250		2,200,000	2,600,000	3,300,000	3,800,000	4,400,000			
Pumping Stations			1,100,000	1,700,000	2,100,000	2,400,000	2,700,000			
<b>Total Costs (£)</b>			<b>3,300,000</b>	<b>4,300,000</b>	<b>5,400,000</b>	<b>6,200,000</b>	<b>7,100,000</b>			
<b>Water Resources</b>										
<b>PDS</b>										
			1,000	5,000	10,000	15,000	20,000			
Wensum Reuse			6,900,000	9,200,000	11,600,000	13,400,000	15,300,000			
GOGDS			2,000,000	2,700,000	3,400,000	3,900,000	4,100,000			
Off line Storage			1,800,000	8,700,000	17,400,000	26,100,000	34,700,000			



Figure 4-11: NPA10 - North West Sector (A1067-NNDR) site infrastructure and constraints





## 4.12 NPA11 - Norwich City

As per Table 1-1, the maximum properties in the NPA areas is 30,000 ((total NPA (44,500) – NPA11 (14,500)), hence NPA11 has been assessed based on 14,500,

The cost mechanism for NPA11 is shown in Table 4-12 and is summarised below with a plan of the related estimated infrastructure, flood risk and environmental constraints shown in Figure 4-12, along with relevant traffic lights where appropriate.

### Wastewater

- One option for the provision of wastewater treatment is Whittingham WWTW.

### Water Supply

- Water would be supplied from Heigham WTW

### Water Resources

- Additional water resources are from connections to Thorpe St Andrew BH and Colney BH, GOGDS, River Wensum reuse and off line storage

### Flood Risk

- The area has been assigned an amber traffic light as between 10-25% of the PGA is within Flood Zone 2 or 3.
- Flood risk from the PGA has been assigned the following traffic lights:
  - From Whittingham WWTW – amber (discharges to tidal reach of River Yare);
  - SUDS has been assigned an amber traffic light (average SUDS suitability)

### Environment

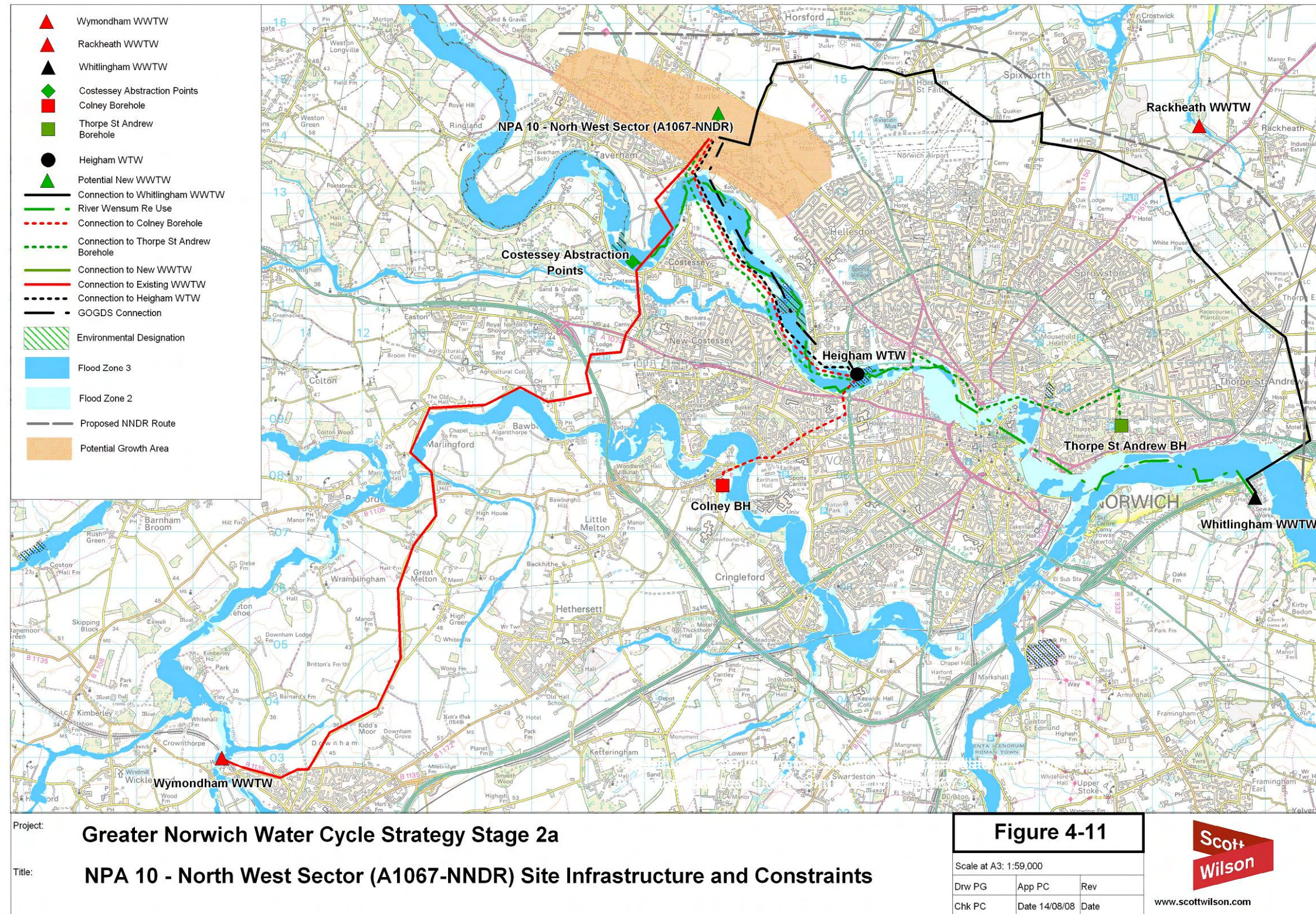
- Conservation designation has been assigned the following traffic lights:
  - From Whittingham WWTW - amber (no conservation designated areas within the PGA but discharge into the River Yare would flow through a designated SAC site). There are no conservation designated areas within the PGA. However, the Sweetbriar Road Meadows SSSI and St James Pit SSSI lie to the northwest extent of the PGAs, which should be considered on siting of development;
  - The PGA has been assigned a red traffic light in relation to groundwater vulnerability.
  - The PGA has been assigned a red traffic light in relation to Source Protection Zone requirements.

Table 4-12: NPA11 total summary costs

Calculations							Section Sheet 1 of 1		Job no. D118607		
Job Title						Norwich Water Cycle Study - Costing Calcs		Date		01/09/2008	
Element						NPA11		Project no.			
Originator	Checked	Revision	Suffix	Orig	1	2	ND				
PC	ND		Date	Check		14/08/2008	PM				
<b>Wastewater</b>											
<b>Whittingham</b>											
	Dist (m)	PDS	1,000	5,000	10,000	14,500, say	15,000				
Trunk Sewer - Rising			-	-	-	-	-				
Trunk Sewer - Gravity	7,250		2,800,000	3,800,000	4,700,000	5,000,000	5,000,000				
Pumping Stations			-	-	-	-	-				
New WWTW (vol)			-	-	-	-	-				
New WWTW (nut)			200,000	700,000	1,400,000	2,000,000	2,000,000				
<b>Total Costs (£)</b>			<b>3,000,000</b>	<b>4,500,000</b>	<b>6,100,000</b>	<b>7,000,000</b>	<b>7,000,000</b>				
<b>Water Supply</b>											
<b>Heigham</b>											
	Dist (m)	PDS	1,000	5,000	10,000	15,000					
Water Main	3,750		900,000	1,100,000	1,400,000	1,600,000	1,600,000				
Pumping Stations			500,000	700,000	900,000	1,000,000	1,000,000				
<b>Total Costs (£)</b>			<b>1,400,000</b>	<b>1,800,000</b>	<b>2,300,000</b>	<b>2,600,000</b>	<b>2,600,000</b>				
<b>Maximise Boreholes</b>											
	Dist (m)	PDS	1,000	5,000	10,000	15,000					
Pipework from Thorpe St A	9,750		2,300,000	2,800,000	3,500,000	4,100,000	4,100,000				
Pumping Stations			1,200,000	1,800,000	2,200,000	2,600,000	2,600,000				
Pipework from Colney	7,000		1,700,000	2,000,000	2,500,000	2,900,000	2,900,000				
Pumping Stations			900,000	1,300,000	1,600,000	1,900,000	1,900,000				
<b>Total Costs (£)</b>			<b>2,600,000</b>	<b>3,300,000</b>	<b>4,100,000</b>	<b>4,800,000</b>	<b>4,800,000</b>				
<b>Water Resources</b>											
<b>Wensum Reuse</b>											
		PDS	1,000	5,000	10,000	15,000					
			6,900,000	9,200,000	11,600,000	13,400,000	13,400,000				
<b>GOGDS</b>											
			1,300,000	1,800,000	2,200,000	2,500,000	2,500,000				
<b>Off line Storage</b>											
			1,800,000	8,700,000	17,400,000	26,100,000	26,100,000				



Figure 4-12: NPA11 - Norwich City site infrastructure and constraints





## 4.13 RPA1 –Reepham

The cost mechanism for RPA1 is shown in Table 4-13 and is summarised below with a plan of the related estimated infrastructure, flood risk and environmental constraints shown in Figure 4-13 along with the relevant traffic lights where appropriate.

### Wastewater

- Reepham WWTW has existing headroom capacity of approximately 300 properties; hence the maximum volumetric upgrade will be for 1,700 properties.




### Water Supply

- Water would be supplied from Heigham WTW

### Water Resources

- Additional water resources are from connections to Thorpe St Andrew BH and Colney BH, GOGDS, River Wensum reuse and off line storage

### Flood Risk

- The area has been assigned a green light as there is less than 10% of the PGA within Flood Zone 2 or 3. 
- Flood risk from the PGA has been assigned the following traffic lights:
  - From Reepham WWTW – green (Tributary of River Wensum). 
  - SUDS has been assigned a red traffic light (poor SUDS suitability) 

### Environment




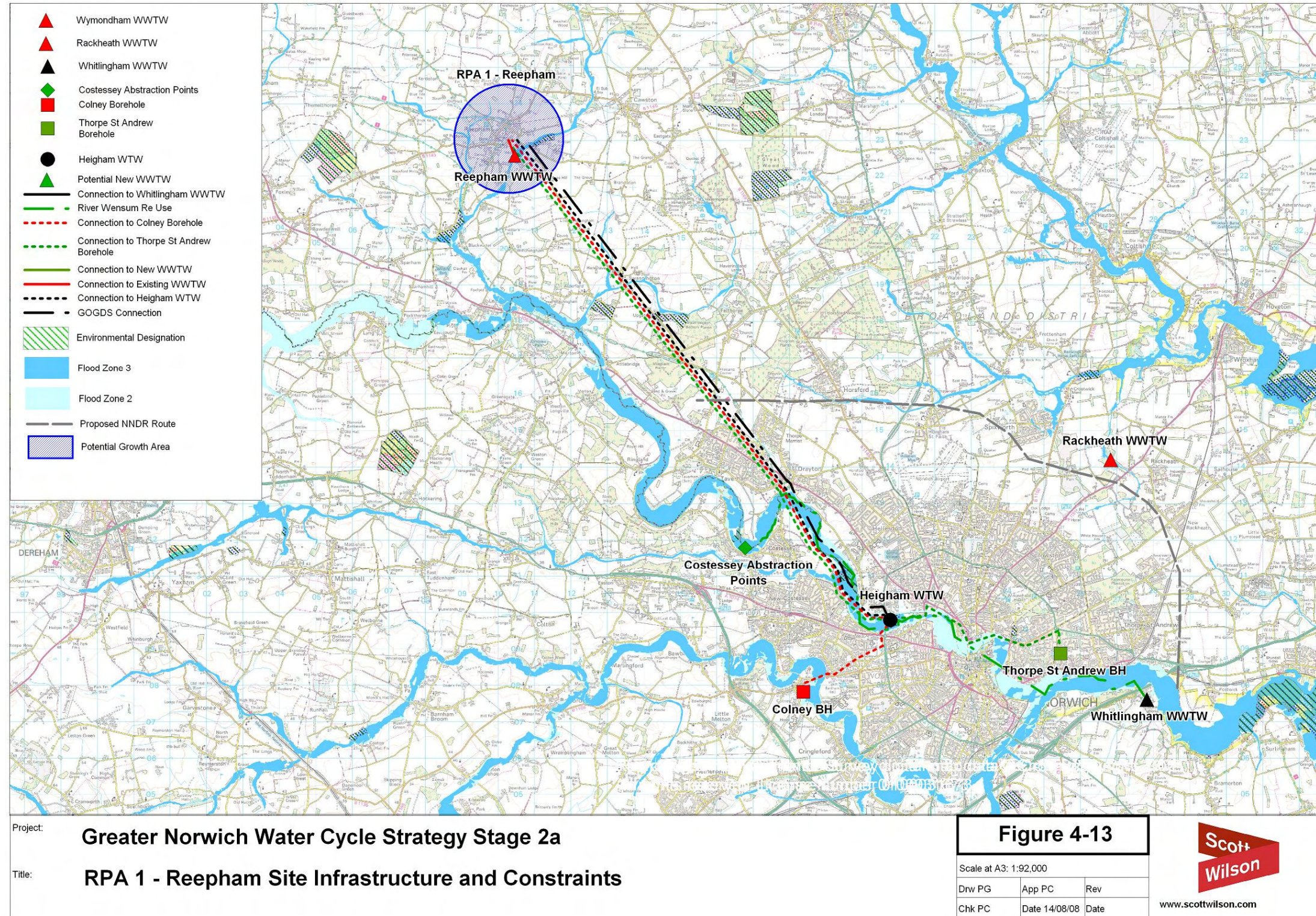
- Conservation designation has been assigned the following traffic lights
  - From Reepham WWTW – red (Booton Common SSSI which lies within the eastern part of the PGA; part of the River Wensum tributary is designated as a SSSI which will be subject to additional wastewater discharge and should be considered accordingly, discharge into the River Wensum tributary would flow through a large SAC designated areas downstream of it) 
  - The PGA has been assigned a red traffic light in relation to groundwater vulnerability. 
  - The PGA has been assigned a green traffic light in relation to Source Protection Zone requirements. 

Table 4-13: RPA1 total summary costs

Calculations							Section Sheet 1 of 1		
Job Title						Date		Job no. D118607	
Element						01/09/2008		Project no.	
Originator	Checked	Revision	Suffix	Orig	1	2	ND		
PC	ND		Date	Check		14/08/2008	PM		
<b>Wastewater</b>									
Upgrade Existing Reepham WWTW									
	Dist (m)	PDS			100	500	1,000	2,000	
Existing Headroom		325	(225)		175		675	1,675	
Trunk Sewer - Rising									
Trunk Sewer - Gravity	500		170,000	170,000		190,000	230,000		
Pumping Stations									
New WWTW (vol)				580,000		2,210,000	8,520,000		
New WWTW (nut)			20,000	70,000		140,000	270,000		
<b>Total Costs (£)</b>			<b>190,000</b>	<b>820,000</b>		<b>2,540,000</b>	<b>9,020,000</b>		
<b>Water Supply</b>									
Heigham									
	Dist (m)	PDS			100	500	1,000	2,000	
Water Main	17,000		3,800,000	3,900,000		3,900,000	4,200,000		
Pumping Stations			1,400,000	1,700,000		2,000,000	2,400,000		
<b>Total Costs (£)</b>			<b>5,200,000</b>	<b>5,600,000</b>		<b>5,900,000</b>	<b>6,600,000</b>		
<b>Maximise Boreholes</b>									
	Dist (m)	PDS			100	500	1,000	2,000	
Pipework from Thorpe St A	23,000		5,200,000	5,200,000		5,300,000	5,600,000		
Pumping Stations			1,900,000	2,300,000		2,700,000	3,300,000		
Pipework from Colney	20,500		4,600,000	4,700,000		4,700,000	5,000,000		
Pumping Stations			1,700,000	2,100,000		2,400,000	2,900,000		
<b>Total Costs (£)</b>			<b>6,300,000</b>	<b>6,800,000</b>		<b>7,100,000</b>	<b>7,900,000</b>		
<b>Water Resources</b>									
		PDS			100	500	1,000	2,000	
Wensum Reuse			6,100,000	6,500,000		6,900,000	7,700,000		
GOGDS			5,200,000	5,600,000		5,900,000	6,500,000		
Off line Storage			200,000	900,000		1,800,000	3,500,000		



Figure 4-13: RPA1 –Reepham site infrastructure and constraints





## 4.14 RPA2 –Aylsham

The cost mechanism for RPA2 is shown in Table 4-14: RPA2 total summary costs and is summarised below with a plan of the related estimated infrastructure, flood risk and environmental constraints shown in Figure 4-14, along with relevant traffic lights where appropriate.

### Wastewater

- Aylsham WWTW does not have any headroom capacity, hence maximum volumetric upgrade will be for 2,000 properties;




### Water Supply

- Water would be supplied from Heigham WTW

### Water Resources

- Additional water resources are from connections to Thorpe St Andrew BH and Colney BH, GOGDS, River Wensum reuse and off line storage

### Flood Risk

- The area has been assigned a green light as there is less than 10% of the PGA within Flood Zone 2 or 3. 
- Flood risk from the PGA has been assigned the following traffic lights:
  - From Aylsham WWTW – amber (discharges to River Bure) 
  - SUDS has been assigned a amber traffic light (average SUDS suitability) 

### Environment




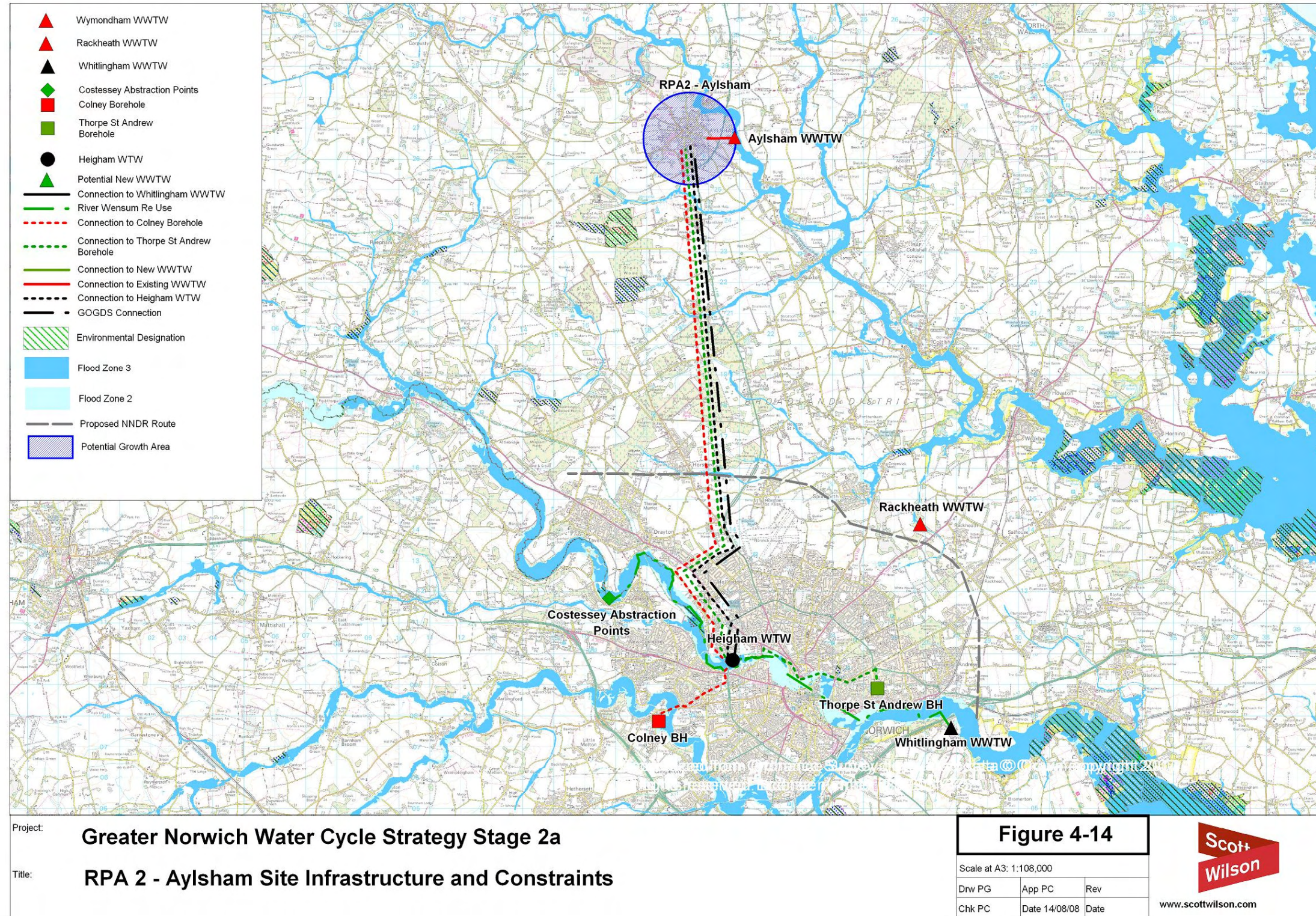
- Conservation designation has been assigned the following traffic lights
  - From Aylsham WWTW – amber (Discharge into the River Bure tributary would flow through a large SAC designated areas downstream of it.) 
  - The PGA has been assigned a red traffic light in relation to groundwater vulnerability. 
  - The PGA has been assigned a green traffic light in relation to Source Protection Zone requirements. 

Table 4-14: RPA2 total summary costs

Calculations									
Job Title <b>Norwich Water Cycle Study - Costing Calcs</b>								Date <b>01/09/2008</b>	
Element <b>RPA2</b>								Project no. <b>D118607</b>	
Originator	Checked	Revision	Suffix	Orig	1	2	ND		
PC	ND		Date	Check		14/08/2008	PM		
<b>Wastewater</b>									
Upgrade Existing Aylsham WWTW									
	Dist (m)	PDS			100	500	1,000	2,000	
Existing Headroom		(226)			326	726	1,226	2,226	
Trunk Sewer - Rising					-	-	-	-	
Trunk Sewer - Gravity	1,000				330,000	330,000	380,000	460,000	
Pumping Stations					-	-	-	-	
New WWTW (vol)					1,420,000	2,380,000	4,010,000	11,320,000	
New WWTW (nut)					20,000	70,000	140,000	270,000	
<b>Total Costs (£)</b>					<b>1,770,000</b>	<b>2,780,000</b>	<b>4,530,000</b>	<b>12,050,000</b>	
<b>Water Supply</b>									
Heigham									
	Dist (m)	PDS			100	500	1,000	2,000	
Water Main	18,000				4,100,000	4,100,000	4,200,000	4,400,000	
Pumping Stations					1,500,000	1,800,000	2,100,000	2,600,000	
<b>Total Costs (£)</b>					<b>5,600,000</b>	<b>5,900,000</b>	<b>6,300,000</b>	<b>7,000,000</b>	
<b>Maximise Boreholes</b>									
	Dist (m)	PDS			100	500	1,000	2,000	
Pipework from Thorpe St A	24,000				5,400,000	5,500,000	5,500,000	5,800,000	
Pumping Stations					1,900,000	2,400,000	2,800,000	3,400,000	
Pipework from Colney	21,500				4,900,000	4,900,000	5,000,000	5,200,000	
Pumping Stations					1,800,000	2,200,000	2,500,000	3,100,000	
<b>Total Costs (£)</b>					<b>6,700,000</b>	<b>7,100,000</b>	<b>7,500,000</b>	<b>8,300,000</b>	
<b>Water Resources</b>									
		PDS			100	500	1,000	2,000	
Wensum Reuse					6,100,000	6,500,000	6,900,000	7,700,000	
GOGDS					5,500,000	5,900,000	6,200,000	6,900,000	
Off line Storage					200,000	900,000	1,800,000	3,500,000	



Figure 4-14: RPA2 –Aylsham site infrastructure and constraints





## 4.15 RPA3 – Wroxham

The cost mechanism for RPA3 is shown in Table 4-15 and is summarised below with a plan of the related estimated infrastructure, flood risk and environmental constraints shown in Figure 4-15, along with relevant traffic lights where appropriate.

### Wastewater

- Belaugh WWTW has existing headroom capacity of approximately 1,900 properties, hence maximum volumetric upgrade will be for only 100 properties;




### Water Supply

- Water would be supplied from Heigham WTW

### Water Resources

- Additional water resources are from connections to Thorpe St Andrew BH and Colney BH, GOGDS, River Wensum reuse and off line storage

### Flood Risk

- The area has been assigned a red light as there is more than 25% of the PGA within Flood Zone 2 or 3; 
- Flood risk from the PGA has been assigned the following traffic lights:
  - From Belaugh WWTW – amber (discharges to the River Bure) 
  - SUDS has been assigned an amber traffic light (average SUDS suitability) 

### Environment




- Conservation designation has been assigned the following traffic lights
  - From Belaugh WWTW - amber (Discharge into the River Bure tributary would flow through a large SAC designated areas downstream of it) 
  - The PGA has been assigned a red traffic light in relation to groundwater vulnerability. 
  - The PGA has been assigned a red traffic light in relation to Source Protection Zone requirements. 

Table 4-15: RPA3 total summary costs

Calculations							Section Sheet 1 of 1		
Job Title						Date		Job no. D118607	
Element						01/09/2008		Project no.	
Originator	Checked	Revision	Suffix	Orig	1	2	ND		
PC	ND		Date	Check		14/08/2008	PM		
<b>Wastewater</b>									
Upgrade Existing Belaugh WWTW									
	Dist	PDS	100	500	1,000	2,000			
Existing Headroom		1915	(1,815)	(1,415)	(915)	85			
Trunk Sewer - Rising			-	-	-	-			
Trunk Sewer - Gravity	1,500		490,000	490,000	560,000	680,000			
Pumping Stations			-	-	-	-			
New WWTW (vol)			-	-	-	440,000			
New WWTW (nut)			20,000	70,000	140,000	270,000			
<b>Total Costs (£)</b>			<b>510,000</b>	<b>560,000</b>	<b>700,000</b>	<b>1,390,000</b>			
<b>Water Supply</b>									
Heigham									
	Dist (m)	PDS	100	500	1,000	2,000			
Water Main	14,500		3,300,000	3,300,000	3,400,000	3,500,000			
Pumping Stations			1,200,000	1,500,000	1,700,000	2,100,000			
<b>Total Costs (£)</b>			<b>4,500,000</b>	<b>4,800,000</b>	<b>5,100,000</b>	<b>5,600,000</b>			
<b>Maximise Boreholes</b>									
	Dist (m)	PDS	100	500	1,000	2,000			
Pipework from Thorpe St A	20,500		4,600,000	4,700,000	4,700,000	5,000,000			
Pumping Stations			1,700,000	2,100,000	2,400,000	2,900,000			
Pipework from Colney	18,000		4,100,000	4,100,000	4,200,000	4,400,000			
Pumping Stations			1,500,000	1,800,000	2,100,000	2,600,000			
<b>Total Costs (£)</b>			<b>5,600,000</b>	<b>5,900,000</b>	<b>6,300,000</b>	<b>7,000,000</b>			
<b>Water Resources</b>									
			100	500	1,000	2,000			
Wensum Reuse			6,100,000	6,500,000	6,900,000	7,700,000			
GOGDS			4,400,000	4,800,000	5,000,000	5,600,000			
Off line Storage			200,000	900,000	1,800,000	3,500,000			



Figure 4-15: RPA3 – Wroxham site infrastructure and constraints

