# Stage 4 Outputs and Sensitivity Tests

**Stage 4 - Calculated Outputs**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) | TP (kgN/yr) | TN (kgP/yr) |
| Step 1: Nutrient Budget* | 306.3 | 587.8 | 301.3 | 227.5 |
| Step 2: Nutrient Budget* X 1.2 | 367.6 | 705.3 | 361.6 | 273.0 |
| **Stage 4 Final Nutrient Load** | **367.60** | **705.3** | **361.58** | **273.0** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - Land Use Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) | TP (kgN/yr) | TN (kgP/yr) |
| Step 1: Nutrient Budget* | 211.84 | -6215.02 | 211.84 | -6215.02 |
| Step 2: Nutrient Budget* X 1.2 | 254.21 | -7458.02 | 254.21 | -7458.02 |
| **Stage 4 Final Nutrient Load** | **254.21** | **-7458.02** | **254.21** | **-7458.02** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - WwTW Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) | TP (kgN/yr) | TN (kgP/yr) |
| Step 1: Nutrient Budget* | 94.49 | 6802.80 | 89.48 | 6442.51 |
| Step 2: Nutrient Budget* X 1.2 | 113.39 | 8163.36 | 107.38 | 7731.01 |
| **Stage 4 Final Nutrient Load** | **113.39** | **8163.36** | **107.38** | **7731.01** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

| Nutrient Mitigation - Wetland Area Requirement Summary | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 30.63 | 0.76 | 30.13 | 0.29 |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - Land Use Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 21.18 | -8.02 | 21.18 | -8.02 |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - WwTW Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 9.45 | 8.78 | 8.95 | 8.31 |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

## Existing and Proposed Development Splits

| Existing Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA Land Use | | | | |
| Open urban land | 7.62 | 0.00 | 18.09 | |
| Greenspace | 61.10 | 0.80 | 18.51 | |
| Lowland | 60.76 | 17.64 | 40.4 | |
| Shrub | 1.69 | 0.00 | 0.36 | |
| Woodland | 0.04 | 0.00 | 0.92 | |
| Cereals | 157.36 | 34.61 | 131.7 | |
| | | | | |
| | | | | |
| | 288.57 | 53.05 | 209.98 | 551.60 |
| | | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Additional Land Use in the Framework Masterplan | | | | |
| Open urban land | 2.96 | 0 | 0 | |
| Greenspace | 16.17 | 0 | 0 | |
| Lowland | 0.00 | 0 | 0 | |
| Shrub | 0.28 | 0 | 0 | |
| Woodland | 0.62 | 0 | 0 | |
| Cereals | 6.11 | 0 | 0 | |
| Commercial/industrial urban land | 18.17 | 0 | 0 | |
| | | | | |
| | | | | |
| | | | | |
| | 44.31 | 0.00 | 0.00 | 44.31 |
| | | | | |
| **TOTAL** | **332.88** | **53.05** | **209.98** | **595.91** |

| Existing Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA + Additional Framework Masterplan Land Use | | | | |
| Open urban land | 10.58 | 0.00 | 18.09 | |
| Greenspace | 77.27 | 0.80 | 18.51 | |
| Lowland | 60.76 | 17.64 | 40.40 | |
| Shrub | 1.97 | 0.00 | 0.36 | |
| Woodland | 0.66 | 0.00 | 0.92 | |
| Cereals | 163.47 | 34.61 | 131.70 | |
| Commercial/industrial urban land | 18.17 | 0.00 | 0.00 | |
| | | | | |
| | **332.88** | **53.05** | **209.98** | **595.91** |

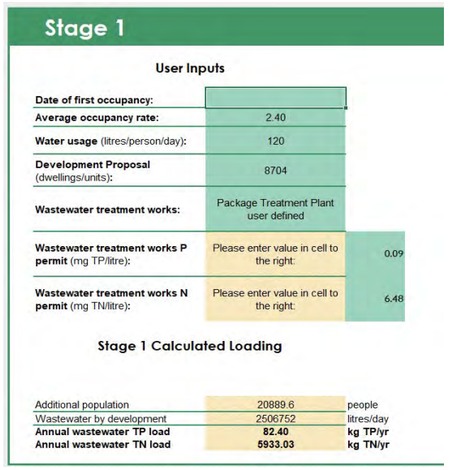
| Proposed Land Use | | | | | |
|---|---|---|---|---|---|
| | | Soilscapes classification | | | |
| | | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| | Otterpool OPA Land Use | | | | |
| Development Parcels | Residential urban land | 145.21 | 13.16 | 98.25 | |
| | Commercial/industrial urban land | 14.50 | 1.50 | | |
| | Greenspace | 25.63 | 2.32 | 17.34 | |
| | community food growing | 0.00 | 0.00 | 0.22 | |
| | | | | | |
| Public Open Space | Open urban land | 5.27 | 2.57 | 6.26 | |
| | Greenspace | 95.07 | 27.98 | 60.79 | |
| | community food growing | 2.69 | 0.00 | 4.07 | |
| | Water - stormwater wetlands | 0.23 | 2.00 | 14.96 | |
| | Water - wastewater wetlands | 0.00 | 3.51 | 8.08 | |
| | | | | | |
| | | 288.60 | 53.04 | 209.97 | 551.61 |
| | | | | | |
| | | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| | Additional Land Use in the Framework Masterplan | | | | |
| Development Parcels | Residential urban land | 30.53 | 0 | 0 | |
| | Commercial/industrial urban land | 0.00 | 0 | 0 | |
| | | | | | |
| | | | | | |
| Public Open Space | Open urban land | 3.23 | 0 | 0 | |
| | Greenspace | 10.55 | 0 | 0 | |
| | | | | | |
| | | | | | |
| | | 44.31 | 0.00 | 0.00 | 44.31 |
| | | | | | |
| | **TOTAL** | **332.91** | **53.04** | **209.97** | **595.92** |

| Proposed Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA + Additional Framework Masterplan Land Use | | | | |
| Development Parcels | Residential urban land | 175.74 | 13.16 | 98.25 |
| | Commercial/industrial urban land | 14.50 | 1.50 | 0.00 |
| | Greenspace | 25.63 | 2.32 | 17.34 |
| | community food growing | 0.00 | 0.00 | 0.22 |
| | | | | |
| Public Open Space | Open urban land | 8.50 | 2.57 | 6.26 |
| | Greenspace | 105.62 | 27.98 | 60.79 |
| | community food growing | 2.69 | 0.00 | 4.07 |
| | Water - stormwater wetlands | 0.23 | 2.00 | 14.96 |
| | Water - wastewater wetlands | 0.00 | 3.51 | 8.08 |
| | | | | |
| | **332.91** | **53.04** | **209.97** | **595.92** |

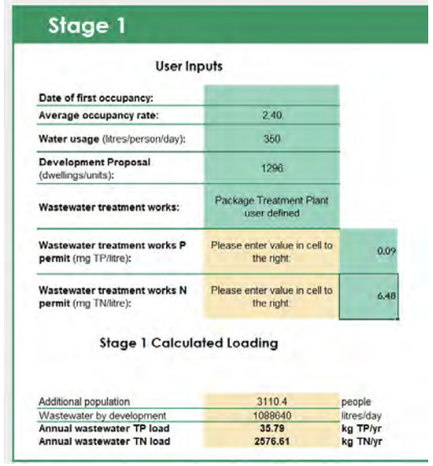
## Stage 1 Outputs

| Scenario 1 | | |
|---|---|---|
| **Stage 1 Results - Breakdown** | | |
| **Total Annual Wastewater TP and TN Load** | | |
| | **Scenario 1** | |
| | **TP (kgN/yr)** | **TN (kgP/yr)** |
| Stage 1 - Residential Class C3 (110 l/p/d + 10% buffer) | 82.4 | 5933.0 |
| Stage 1 - Residential Class C2 (350 l/p/d) | 35.8 | 2576.6 |
| Stage 1 - Residential Class C1 (300 l/p/d) | 2.3 | 166.2 |
| **Final Stage 1 Output** | **120.5** | **8675.8** |

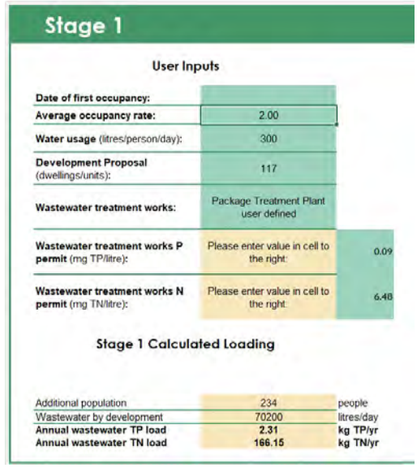
**Residential Class C3 (110 l/p/d + 10% buffer)**




**Residential Class C2 (350 l/p/d)**

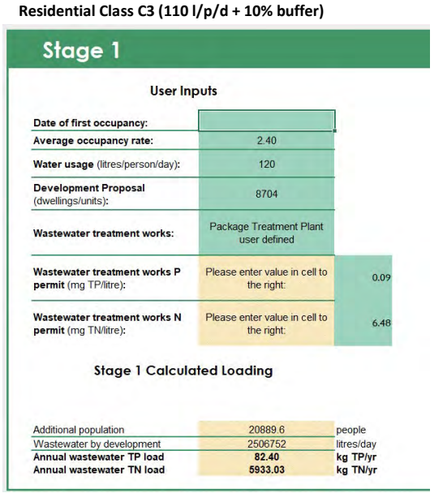



**Residential Class C1 (300 l/p/d)**

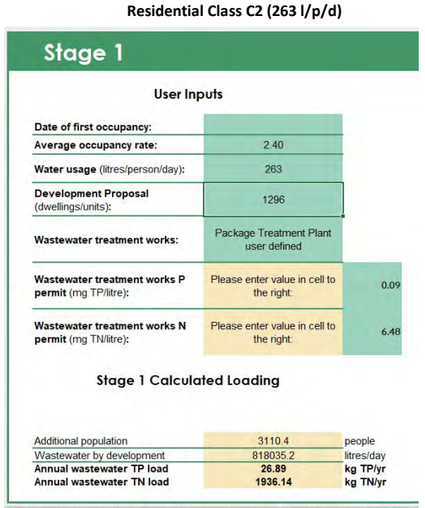



| Scenario 2 | | |
|---|---|---|
| **Stage 1 Results - Breakdown** | | |
| **Total Annual Wastewater TP and TN Load** | | |
| | **Scenario 2** | |
| | **TP (kgN/yr)** | **TN (kgP/yr)** |
| Stage 1 - Residential Class C3 (110 l/p/d + 10% buffer) | 82.4 | 5933.0 |
| Stage 1 - Residential Class C2 (262.5 l/p/d) | 26.9 | 1936.1 |
| Stage 1 - Residential Class C1 (225 l/p/d) | 1.7 | 124.6 |
| **Final Stage 1 Output** | **111.0** | **7993.8** |

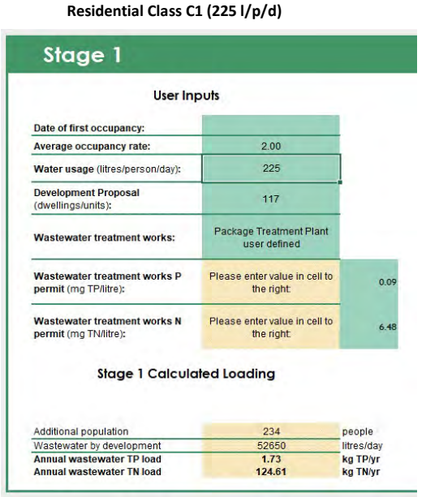
**Residential Class C3 (110 l/p/d + 10% buffer)**




**Residential Class C2 (263 l/p/d)**




**Residential Class C1 (225 l/p/d)**



# Stage 2 Outputs

## Stage 2 Results - Breakdown

| | TP (kg/yr) | TN (kg/yr) |
|---|---|---|
| Stage 2 - Freely Draining | 62.9 | 6419.4 |
| Stage 2 - Impeded Drainage | 44.2 | 931.0 |
| Stage 2 - Naturally wet | 111.8 | 3765.0 |
| **Final Stage 2 Output** | **218.9** | **11115.4** |

### Stage 2 - Freely Draining

**Stage 2**

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Freely draining |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 7.62 | 5.93 | 60.69 |
| Greenspace | 61.10 | 1.22 | 183.30 |
| Lowland | 60.76 | 6.82 | 867.44 |
| Shrub | 1.69 | 0.03 | 5.07 |
| Woodland | 0.04 | 0.00 | 0.11 |
| Cereals | 157.36 | 26.00 | 4906.60 |
| Open urban land | 2.96 | 2.30 | 23.57 |
| Greenspace | 16.17 | 0.32 | 48.51 |
| Lowland | 0.00 | 0.00 | 0.00 |
| Shrub | 0.28 | 0.01 | 0.84 |
| Woodland | 0.62 | 0.01 | 1.86 |
| Cereals | 6.11 | 1.01 | 190.51 |
| Commercial/industrial urban land | 18.17 | 19.28 | 130.91 |
| **Total:** | **332.88** | **62.94** | **6419.41** |

### Stage 2 - Impeded Drainage

**Stage 2**

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Impeded drainage |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 0.00 | 0.00 | 0.00 |
| Greenspace | 0.80 | 0.02 | 2.40 |
| Lowland | 17.64 | 11.99 | 166.91 |
| Shrub | 0.00 | 0.00 | 0.00 |
| Woodland | 0.00 | 0.00 | 0.00 |
| Cereals | 34.61 | 32.17 | 761.72 |
| **Total:** | **53.048** | **44.18** | **931.02** |

### Stage 2 - Naturally Wet

**Stage 2**

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Naturally wet |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 18.09 | 14.08 | 144.06 |
| Greenspace | 18.51 | 0.37 | 55.53 |
| Lowland | 40.40 | 7.51 | 451.22 |
| Shrub | 0.36 | 0.01 | 1.08 |
| Woodland | 0.92 | 0.02 | 2.75 |
| Cereals | 131.70 | 89.83 | 3110.33 |
| **Total:** | **209.99** | **111.82** | **3764.97** |

## Stage 3 Outputs

| Stage 3 Results - Breakdown<br>Total Annual Phosphorous and Nitrogen Nutrient Export | | |
|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) |
| Stage 3 - Freely Draining | 280.7 | 2987.2 |
| Stage 3 - Impeded Drainage | 23.3 | 299.9 |
| Stage 3 - Naturally wet | 150.8 | 1686.9 |
| **Final Stage 3 Output** | **454.8** | **4974.0** |

### Stage 3 - Freely Draining

**Stage 3**

**User Inputs**

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 145.21 | 210.62 | 1961.59 |
| Commercial/industrial urban land | 14.50 | 15.39 | 104.47 |
| Greenspace | 25.63 | 0.51 | 76.89 |
| Open urban land | 5.27 | 4.10 | 41.97 |
| Greenspace | 95.07 | 1.90 | 285.21 |
| Community food growing | 2.69 | 1.19 | 47.27 |
| Water | 0.23 | 0.00 | 0.00 |
| | | | |
| Residential urban land | 30.53 | 44.28 | 412.42 |
| Commercial/industrial urban land | 0.00 | 0.00 | 0.00 |
| Greenspace | 10.55 | 0.21 | 31.65 |
| Open urban land | 3.23 | 2.51 | 25.72 |
| **Total:** | **332.908942** | **280.72** | **2987.19** |

### Stage 3 - Impeded Drainage

**Stage 3**

**User Inputs**

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 13.16 | 19.09 | 177.77 |
| Commercial/industrial urban land | 1.50 | 1.59 | 10.81 |
| Greenspace | 2.32 | 0.05 | 6.96 |
| Open urban land | 2.57 | 2.00 | 20.44 |
| Greenspace | 27.98 | 0.56 | 83.94 |
| Water | 2.00 | 0.00 | 0.00 |
| Water | 3.51 | 0.00 | 0.00 |
| **Total:** | **53.032** | **23.28** | **299.92** |

### Stage 3 - Naturally Wet

**Stage 3**

**User Inputs**

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 98.25 | 142.51 | 1327.23 |
| Community food growing | 0.22 | 0.10 | 3.84 |
| Greenspace | 17.34 | 0.35 | 52.02 |
| Open urban land | 6.26 | 4.87 | 49.85 |
| Greenspace | 60.79 | 1.22 | 182.38 |
| Community food growing | 4.07 | 1.80 | 71.54 |
| Water | 14.96 | 0.00 | 0.00 |
| Water | 8.08 | 0.00 | 0.00 |
| **Total:** | **209.97162** | **150.84** | **1686.86** |

Please enter area in hectares.

# Stage 4 Outputs and Sensitivity Tests

**Stage 4 - Calculated Outputs**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) | TP (kgN/yr) | TN (kgP/yr) |
| Step 1: Nutrient Budget* | 356.4 | 2534.4 | 346.9 | 1852.4 |
| Step 2: Nutrient Budget* X 1.2 | 427.7 | 3041.2 | 416.3 | 2222.8 |
| **Stage 4 Final Nutrient Load** | **427.7** | **3041.2** | **416.3** | **2222.8** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - Land Use Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) | TP (kgN/yr) | TN (kgP/yr) |
| Step 1: Nutrient Budget* | 235.90 | -6141.43 | 235.90 | -6141.43 |
| Step 2: Nutrient Budget* X 1.2 | 283.08 | -7369.72 | 283.08 | -7369.72 |
| **Stage 4 Final Nutrient Load** | **283.08** | **-7369.72** | **283.08** | **-7369.72** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - WwTW Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgN/yr) | TN (kgP/yr) | TP (kgN/yr) | TN (kgP/yr) |
| Step 1: Nutrient Budget* | 120.50 | 8675.79 | 111.02 | 7993.78 |
| Step 2: Nutrient Budget* X 1.2 | 144.60 | 10410.95 | 133.22 | 9592.54 |
| **Stage 4 Final Nutrient Load** | **144.60** | **10410.95** | **133.22** | **9592.54** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

# Nutrient Mitigation Outputs and Sensitivity Tests

| Nutrient Mitigation - Wetland Area Requirement Summary | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 35.64 | 3.27 | 34.69 | 2.39 |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - Land Use Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 23.59 | -7.92 | 23.59 | -7.92 |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - WwTW Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 12.05 | 11.19 | 11.10 | 10.31 |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

# Appendix C

## Nutrient Neutrality Assessment – For Sellindge WwTW

# Offsite WwTW - OPA

## Existing and Proposed Development Splits

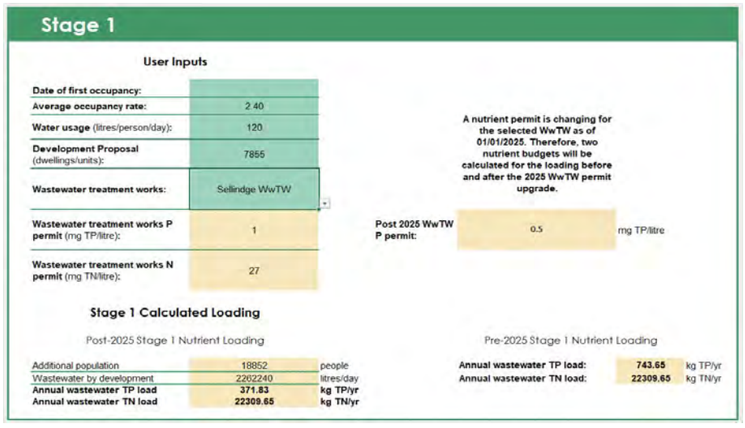
| Existing Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA Land Use | | | | |
| Open urban land | 7.62 | 0.00 | 18.09 | |
| Greenspace | 61.10 | 0.80 | 18.51 | |
| Lowland | 60.76 | 17.64 | 40.4 | |
| Shrub | 1.69 | 0.00 | 0.36 | |
| Woodland | 0.04 | 0.00 | 0.92 | |
| Cereals | 157.36 | 34.61 | 131.7 | |
| | | | | |
| | | | | |
| | 288.57 | 53.05 | 209.98 | 551.60 |

| Proposed Land Use | | | | |
|---|---|---|---|---|
| | | Soilscapes classification | | |
| | | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| | Otterpool OPA Land Use | | | | |
| Development Parcels | Residential urban land | 145.21 | 13.16 | 98.25 | |
| | Commercial/industrial urban land | 14.50 | 1.50 | | |
| | Greenspace | 25.63 | 2.32 | 17.34 | |
| | community food growing | 0.00 | 0.00 | 0.22 | |
| | | | | | |
| Public Open Space | Open urban land | 5.27 | 2.57 | 6.26 | |
| | Greenspace | 95.07 | 27.98 | 60.79 | |
| | community food growing | 2.69 | 0.00 | 4.07 | |
| | Water - stormwater wetlands | 0.23 | 2.00 | 14.96 | |
| | Water - wastewater wetlands | 0.00 | 3.51 | 8.08 | |
| | | | | | |
| | | 288.60 | 53.04 | 209.97 | 551.61 |

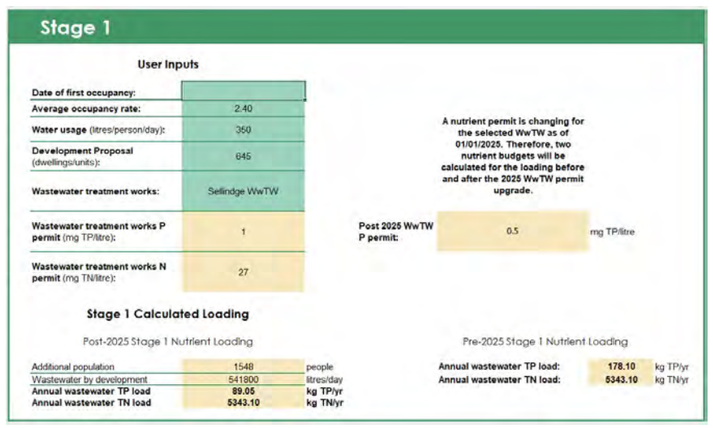
## Stage 1 Outputs

| Scenario 1 | | |
|---|---|---|
| **Stage 1 Results - Breakdown** | | |
| **Total Annual Wastewater TP and TN Load** | | |
| | **Scenario 1** | |
| | **TP (kgP/yr)** | **TN (kgN/yr)** |
| Stage 1 - Residential Class C3 (110 l/p/d + 10% buffer) | 371.8 | 22309.7 |
| Stage 1 - Residential Class C2 (350 l/p/d) | 89.1 | 5343.1 |
| Stage 1 - Residential Class C1 (300 l/p/d) | 11.5 | 692.3 |
| **Final Stage 1 Output** | **472.4** | **28345.0** |

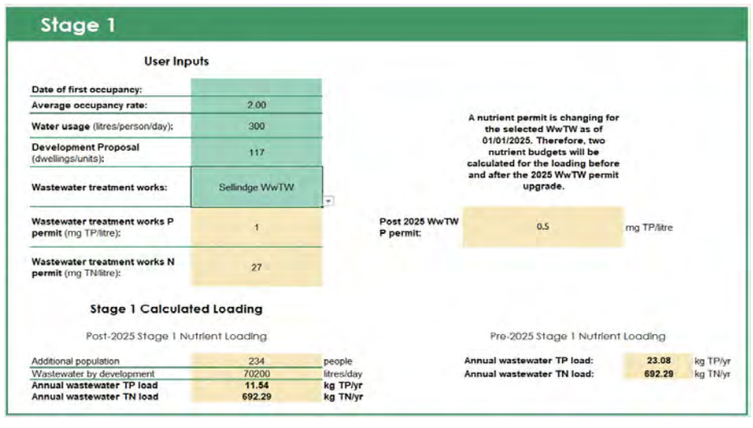
**Residential Class C3 (110 l/p/d + 10% buffer)**




**Residential Class C2 (350 l/p/d)**

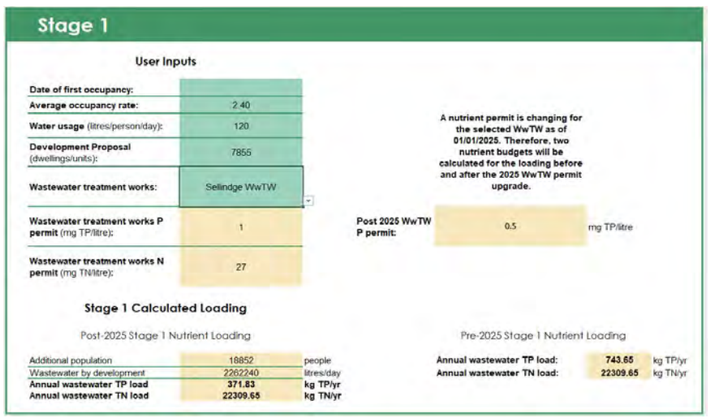



**Residential Class C1 (300 l/p/d)**

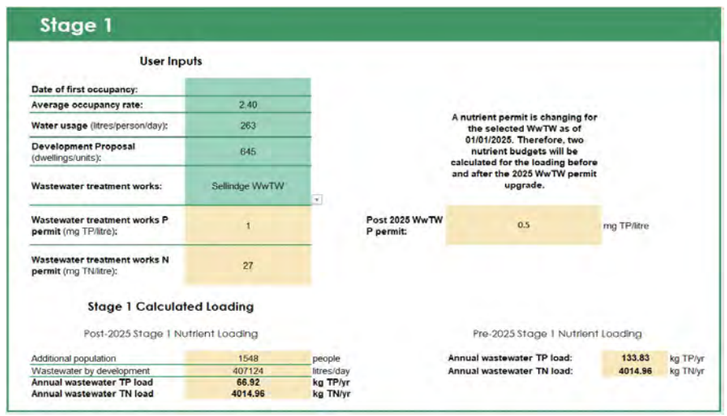



| Scenario 2 | | |
|---|---|---|
| **Stage 1 Results - Breakdown** | | |
| **Total Annual Wastewater TP and TN Load** | | |
| | **Scenario 2** | |
| | **TP (kgP/yr)** | **TN (kgN/yr)** |
| Stage 1 - Residential Class C3 (110 l/p/d + 10% buffer) | 371.8 | 22309.7 |
| Stage 1 - Residential Class C2 (262.5 l/p/d) | 66.9 | 4015.0 |
| Stage 1 - Residential Class C1 (225 l/p/d) | 8.7 | 519.2 |
| **Final Stage 1 Output** | **447.4** | **26843.8** |

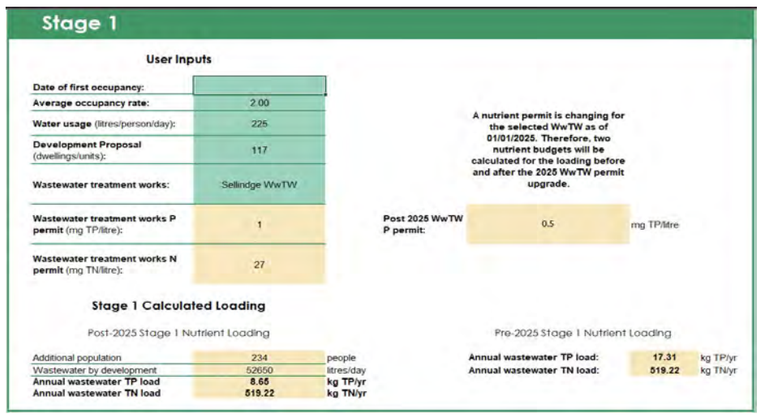
**Residential Class C3 (110 l/p/d + 10% buffer)**




**Residential Class C2 (263 l/p/d)**




**Residential Class C1 (225 l/p/d)**



# Stage 2 Outputs

**Stage 2 Results - Breakdown**

| | TP (kg/yr) | TN (kg/yr) |
|---|---|---|
| Stage 2 - Freely Draining | 40.0 | 6023.2 |
| Stage 2 - Impeded Drainage | 44.2 | 931.0 |
| Stage 2 - Naturally wet | 111.8 | 3765.0 |
| **Final Stage 2 Output** | **196.0** | **10719.2** |

**Stage 2 - Freely Draining**

## Stage 2

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Freely draining |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 7.62 | 5.93 | 60.69 |
| Greenspace | 61.10 | 1.22 | 183.30 |
| Lowland | 60.76 | 6.82 | 867.44 |
| Shrub | 1.69 | 0.03 | 5.07 |
| Woodland | 0.04 | 0.00 | 0.11 |
| Cereals | 157.36 | 26.00 | 4906.60 |
| **Total:** | **288.57** | **40.00** | **6023.21** |

**Stage 2 - Impeded Drainage**

## Stage 2

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Impeded drainage |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 0.00 | 0.00 | 0.00 |
| Greenspace | 0.80 | 0.02 | 2.40 |
| Lowland | 17.64 | 11.99 | 166.91 |
| Shrub | 0.00 | 0.00 | 0.00 |
| Woodland | 0.00 | 0.00 | 0.00 |
| Cereals | 34.61 | 32.17 | 761.72 |
| **Total:** | **53.048** | **44.18** | **931.02** |

**Stage 2 - Naturally Wet**

## Stage 2

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Naturally wet |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 18.09 | 14.08 | 144.06 |
| Greenspace | 18.51 | 0.37 | 55.53 |
| Lowland | 40.40 | 7.51 | 451.22 |
| Shrub | 0.36 | 0.01 | 1.08 |
| Woodland | 0.92 | 0.02 | 2.75 |
| Cereals | 131.70 | 89.83 | 3110.33 |
| **Total:** | **209.99** | **111.82** | **3764.97** |

## Stage 3 Outputs

**Stage 3 Results - Breakdown**
**Total Annual Phosphorous and Nitrogen Nutrient Export**

| | TP (kgN/yr) | TN (kgP/yr) |
|---|---|---|
| Stage 3 - Freely Draining | 233.7 | 2517.4 |
| Stage 3 - Impeded Drainage | 23.3 | 299.9 |
| Stage 3 - Naturally wet | 150.8 | 1686.9 |
| **Final Stage 3 Output** | **407.8** | **4504.2** |

**Stage 3 - Freely Draining**

**Stage 3**

User Inputs

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 145.21 | 210.62 | 1961.59 |
| Commercial/industrial urban land | 14.50 | 15.39 | 104.47 |
| Greenspace | 25.63 | 0.51 | 76.89 |
| Open urban land | 5.27 | 4.10 | 41.97 |
| Greenspace | 95.07 | 1.90 | 285.21 |
| Community food growing | 2.69 | 1.19 | 47.27 |
| Water | 0.23 | 0.00 | 0.00 |
| | | | |
| | | | |
| Total: | 288.59894 | 233.72 | 2517.40 |

**Stage 3 - Impeded Drainage**

**Stage 3**

User Inputs

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 13.16 | 19.09 | 177.77 |
| Commercial/industrial urban land | 1.50 | 1.59 | 10.81 |
| Greenspace | 2.32 | 0.05 | 6.96 |
| Open urban land | 2.57 | 2.00 | 20.44 |
| Greenspace | 27.98 | 0.56 | 83.94 |
| Water | 2.00 | 0.00 | 0.00 |
| Water | 3.51 | 0.00 | 0.00 |
| | | | |
| Total: | 53.032 | 23.28 | 299.92 |

**Stage 3 - Naturally Wet**

**Stage 3**

User Inputs

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 98.25 | 142.51 | 1327.23 |
| Community food growing | 0.22 | 0.10 | 3.84 |
| Greenspace | 17.34 | 0.35 | 52.02 |
| Open urban land | 6.26 | 4.87 | 49.85 |
| Greenspace | 60.79 | 1.22 | 182.38 |
| Community food growing | 4.07 | 1.80 | 71.54 |
| Water | 14.96 | 0.00 | 0.00 |
| Water | 8.08 | 0.00 | 0.00 |
| Total: | 209.97162 | 150.84 | 1686.86 |

Please enter area in hectares.

# Stage 4 Outputs and Sensitivity Tests

**Stage 4 - Calculated Outputs**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgP/yr) | TN (kgN/yr) | TP (kgP/yr) | TN (kgN/yr) |
| Step 1: Nutrient Budget* | 684.3 | 22130.0 | 659.2 | 20628.8 |
| Step 2: Nutrient Budget* X 1.2 | 821.1 | 26556.0 | 791.1 | 24754.6 |
| **Stage 4 Final Nutrient Load** | **821.1** | **26556.0** | **791.1** | **24754.6** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - Land Use Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgP/yr) | TN (kgN/yr) | TP (kgP/yr) | TN (kgN/yr) |
| Step 1: Nutrient Budget* | 211.84 | -6215.02 | 211.84 | -6215.02 |
| Step 2: Nutrient Budget* X 1.2 | 254.21 | -7458.02 | 254.21 | -7458.02 |
| **Stage 4 Final Nutrient Load** | **254.21** | **-7458.02** | **254.21** | **-7458.02** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - WwTW Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgP/yr) | TN (kgN/yr) | TP (kgP/yr) | TN (kgN/yr) |
| Step 1: Nutrient Budget* | 472.42 | 28345.04 | 447.40 | 26843.83 |
| Step 2: Nutrient Budget* X 1.2 | 566.90 | 34014.05 | 536.88 | 32212.60 |
| **Stage 4 Final Nutrient Load** | **566.90** | **34014.05** | **536.88** | **32212.60** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

# Nutrient Mitigation Outputs and Sensitivity Tests

| Nutrient Mitigation - Wetland Area Requirement Summary | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 68.43 | 28.55 | 65.92 | 26.62 |
| | | | | |
| Assumed Wetland TN removal rate | 93 | g/m2/yr | | |
| Assumed Wetland TP removal rate | 1.2 | g/m2/yr | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - Land Use Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 21.18 | -8.02 | 21.18 | -8.02 |
| | | | | |
| Assumed Wetland TN removal rate | 93 | g/m2/yr | | |
| Assumed Wetland TP removal rate | 1.2 | g/m2/yr | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - WwTW Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 47.24 | 36.57 | 44.74 | 34.64 |
| | | | | |
| Assumed Wetland TN removal rate | 93 | g/m2/yr | | |
| Assumed Wetland TP removal rate | 1.2 | g/m2/yr | | |

# Offsite WwTW - FMP

## Existing and Proposed Development Splits

| Existing Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA Land Use | | | | |
| Open urban land | 7.62 | 0.00 | 18.09 | |
| Greenspace | 61.10 | 0.80 | 18.51 | |
| Lowland | 60.76 | 17.64 | 40.4 | |
| Shrub | 1.69 | 0.00 | 0.36 | |
| Woodland | 0.04 | 0.00 | 0.92 | |
| Cereals | 157.36 | 34.61 | 131.7 | |
| | | | | |
| | | | | |
| | 288.57 | 53.05 | 209.98 | 551.60 |

| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
|---|---|---|---|---|
| Additional Land Use in the Framework Masterplan | | | | |
| Open urban land | 2.96 | 0 | 0 | |
| Greenspace | 16.17 | 0 | 0 | |
| Lowland | 0.00 | 0 | 0 | |
| Shrub | 0.28 | 0 | 0 | |
| Woodland | 0.62 | 0 | 0 | |
| Cereals | 6.11 | 0 | 0 | |
| Commercial/industrial urban land | 18.17 | 0 | 0 | |
| | | | | |
| | | | | |
| | | | | |
| | 44.31 | 0.00 | 0.00 | 44.31 |
| | | | | |
| **TOTAL** | **332.88** | **53.05** | **209.98** | **595.91** |

| Existing Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA + Additional Framework Masterplan Land Use | | | | |
| Open urban land | 10.58 | 0.00 | 18.09 | |
| Greenspace | 77.27 | 0.80 | 18.51 | |
| Lowland | 60.76 | 17.64 | 40.40 | |
| Shrub | 1.97 | 0.00 | 0.36 | |
| Woodland | 0.66 | 0.00 | 0.92 | |
| Cereals | 163.47 | 34.61 | 131.70 | |
| Commercial/industrial urban land | 18.17 | 0.00 | 0.00 | |
| | | | | |
| | **332.88** | **53.05** | **209.98** | **595.91** |

| Proposed Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA Land Use | | | | |
| Development Parcels: Residential urban land | 145.21 | 13.16 | 98.25 | |
| Development Parcels: Commercial/industrial urban land | 14.50 | 1.50 | | |
| Development Parcels: Greenspace | 25.63 | 2.32 | 17.34 | |
| Development Parcels: community food growing | 0.00 | 0.00 | 0.22 | |
| | | | | |
| Public Open Space: Open urban land | 5.27 | 2.57 | 6.26 | |
| Public Open Space: Greenspace | 95.07 | 27.98 | 60.79 | |
| Public Open Space: community food growing | 2.69 | 0.00 | 4.07 | |
| Public Open Space: Water - stormwater wetlands | 0.23 | 2.00 | 14.96 | |
| Public Open Space: Water - wastewater wetlands | 0.00 | 3.51 | 8.08 | |
| | | | | |
| | 288.60 | 53.04 | 209.97 | 551.61 |

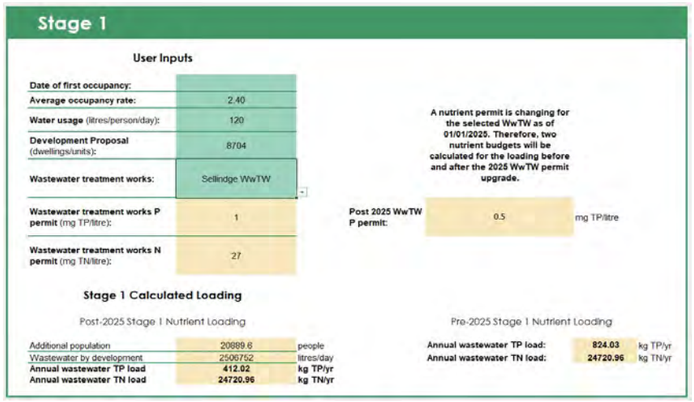
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
|---|---|---|---|---|
| Additional Land Use in the Framework Masterplan | | | | |
| Development Parcels: Residential urban land | 30.53 | 0 | 0 | |
| Development Parcels: Commercial/industrial urban land | 0.00 | 0 | 0 | |
| | | | | |
| | | | | |
| Public Open Space: Open urban land | 3.23 | 0 | 0 | |
| Public Open Space: Greenspace | 10.55 | 0 | 0 | |
| | | | | |
| | | | | |
| | 44.31 | 0.00 | 0.00 | 44.31 |
| | | | | |
| **TOTAL** | **332.91** | **53.04** | **209.97** | **595.92** |

| Proposed Land Use | | | | |
|---|---|---|---|---|
| | Soilscapes classification | | | |
| | Freely draining | Slowly permeable (Impeded Drainage) | Naturally Wet | |
| Otterpool OPA + Additional Framework Masterplan Land Use | | | | |
| Development Parcels: Residential urban land | 175.74 | 13.16 | 98.25 | |
| Development Parcels: Commercial/industrial urban land | 14.50 | 1.50 | 0.00 | |
| Development Parcels: Greenspace | 25.63 | 2.32 | 17.34 | |
| Development Parcels: community food growing | 0.00 | 0.00 | 0.22 | |
| | | | | |
| Public Open Space: Open urban land | 8.50 | 2.57 | 6.26 | |
| Public Open Space: Greenspace | 105.62 | 27.98 | 60.79 | |
| Public Open Space: community food growing | 2.69 | 0.00 | 4.07 | |
| Public Open Space: Water - stormwater wetlands | 0.23 | 2.00 | 14.96 | |
| Public Open Space: Water - wastewater wetlands | 0.00 | 3.51 | 8.08 | |
| | | | | |
| | **332.91** | **53.04** | **209.97** | **595.92** |

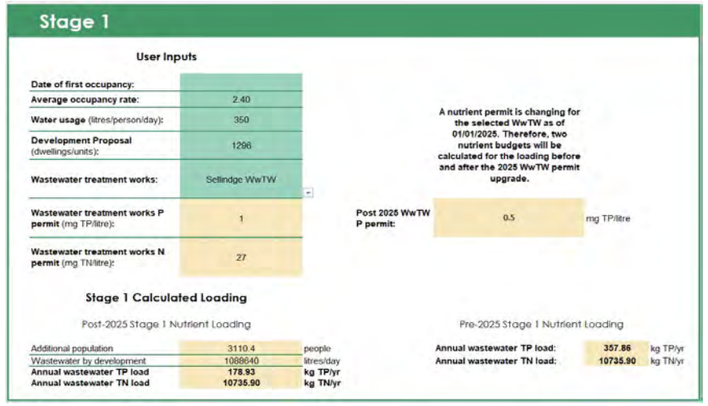
## Stage 1 Outputs

| Scenario 1 | | |
|---|---|---|
| **Stage 1 Results - Breakdown** | | |
| **Total Annual Wastewater TP and TN Load** | | |
| | **Scenario 1** | |
| | **TP (kgP/yr)** | **TN (kgN/yr)** |
| Stage 1 - Residential Class C3 (110 l/p/d + 10% buffer) | 412.0 | 24721.0 |
| Stage 1 - Residential Class C2 (350 l/p/d) | 178.9 | 10735.9 |
| Stage 1 - Residential Class C1 (300 l/p/d) | 11.5 | 692.3 |
| **Final Stage 1 Output** | **602.5** | **36149.2** |

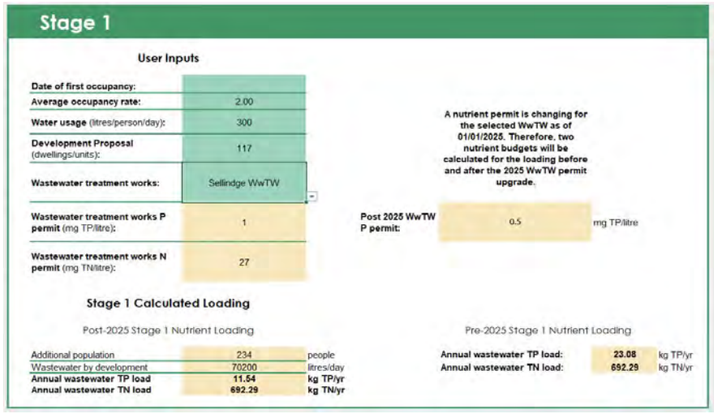
**Residential Class C3 (110 l/p/d + 10% buffer)**




**Residential Class C2 (350 l/p/d)**

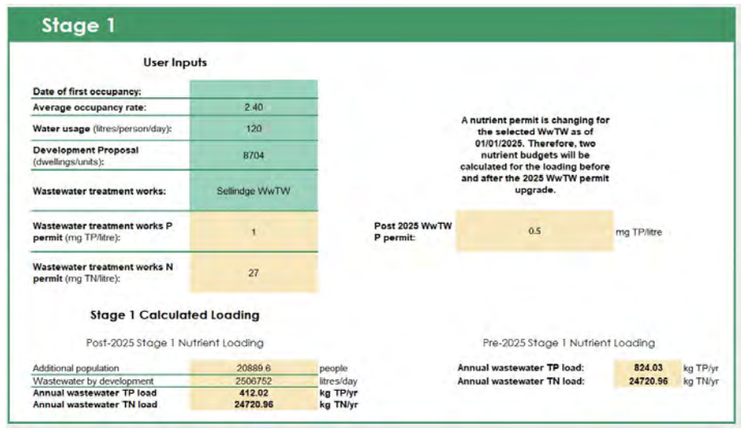



**Residential Class C1 (300 l/p/d)**

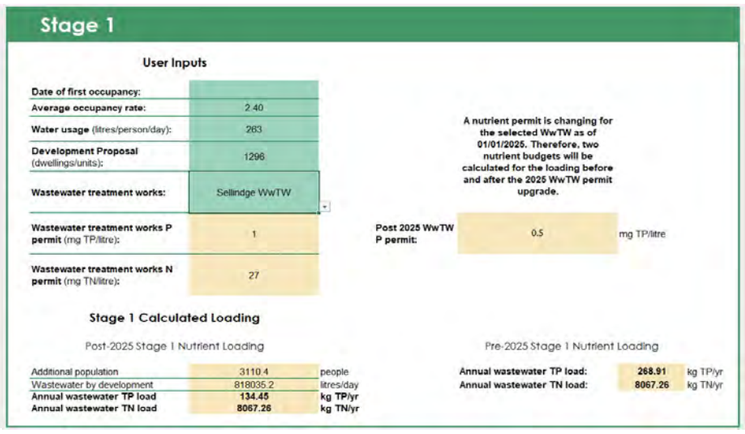



| Scenario 2 | | |
|---|---|---|
| **Stage 1 Results - Breakdown** | | |
| **Total Annual Wastewater TP and TN Load** | | |
| | **Scenario 2** | |
| | **TP (kgP/yr)** | **TN (kgN/yr)** |
| Stage 1 - Residential Class C3 (110 l/p/d + 10% buffer) | 412.0 | 24721.0 |
| Stage 1 - Residential Class C2 (262.5 l/p/d) | 134.5 | 8067.3 |
| Stage 1 - Residential Class C1 (225 l/p/d) | 8.7 | 519.2 |
| **Final Stage 1 Output** | **555.1** | **33307.4** |

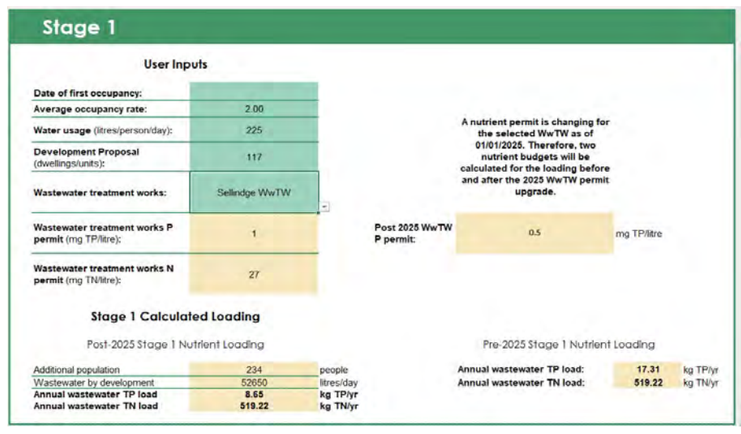
**Residential Class C3 (110 l/p/d + 10% buffer)**




**Residential Class C2 (263 l/p/d)**




**Residential Class C1 (225 l/p/d)**



## Stage 2 Outputs

**Stage 2 Results - Breakdown**

| | TP (kg/yr) | TN (kg/yr) |
|---|---|---|
| Stage 2 - Freely Draining | 62.9 | 6419.4 |
| Stage 2 - Impeded Drainage | 44.2 | 931.0 |
| Stage 2 - Naturally wet | 111.8 | 3765.0 |
| **Final Stage 2 Output** | **218.9** | **11115.4** |

**Stage 2 - Freely Draining**

**Stage 2**

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Freely draining |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 7.62 | 5.93 | 60.69 |
| Greenspace | 61.10 | 1.22 | 183.30 |
| Lowland | 60.76 | 6.82 | 867.44 |
| Shrub | 1.69 | 0.03 | 5.07 |
| Woodland | 0.04 | 0.00 | 0.11 |
| Cereals | 157.36 | 26.00 | 4906.60 |
| Open urban land | 2.96 | 2.30 | 23.57 |
| Greenspace | 16.17 | 0.32 | 48.51 |
| Lowland | 0.00 | 0.00 | 0.00 |
| Shrub | 0.28 | 0.01 | 0.84 |
| Woodland | 0.62 | 0.01 | 1.86 |
| Cereals | 6.11 | 1.01 | 190.51 |
| Commercial/industrial urban land | 18.17 | 19.28 | 130.91 |
| **Total:** | **332.88** | **62.94** | **6419.41** |

**Stage 2 - Impeded Drainage**

**Stage 2**

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Impeded drainage |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 0.00 | 0.00 | 0.00 |
| Greenspace | 0.80 | 0.02 | 2.40 |
| Lowland | 17.64 | 11.99 | 166.91 |
| Shrub | 0.00 | 0.00 | 0.00 |
| Woodland | 0.00 | 0.00 | 0.00 |
| Cereals | 34.61 | 32.17 | 761.72 |
| **Total:** | **53.048** | **44.18** | **931.02** |

**Stage 2 - Naturally Wet**

**Stage 2**

**User Inputs**

| | |
|---|---|
| **Catchment:** | Upper Stour |
| **Soil drainage type:** | Naturally wet |
| **Annual average rainfall** (mm): | 700.1 - 750 |
| **Within Nitrate Vulnerable Zone (NVZ):** | Yes |

| Existing land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Open urban land | 18.09 | 14.08 | 144.06 |
| Greenspace | 18.51 | 0.37 | 55.53 |
| Lowland | 40.40 | 7.51 | 451.22 |
| Shrub | 0.36 | 0.01 | 1.08 |
| Woodland | 0.92 | 0.02 | 2.75 |
| Cereals | 131.70 | 89.83 | 3110.33 |
| **Total:** | **209.99** | **111.82** | **3764.97** |

## Stage 3 Outputs

**Stage 3 Results - Breakdown**
**Total Annual Phosphorous and Nitrogen Nutrient Export**

| | TP (kgN/yr) | TN (kgP/yr) |
|---|---|---|
| Stage 3 - Freely Draining | 280.7 | 2987.2 |
| Stage 3 - Impeded Drainage | 23.3 | 299.9 |
| Stage 3 - Naturally wet | 150.8 | 1686.9 |
| **Final Stage 3 Output** | **454.8** | **4974.0** |

**Stage 3 - Freely Draining**

**Stage 3**

**User Inputs**

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 145.21 | 210.62 | 1961.59 |
| Commercial/industrial urban land | 14.50 | 15.39 | 104.47 |
| Greenspace | 25.63 | 0.51 | 76.89 |
| Open urban land | 5.27 | 4.10 | 41.97 |
| Greenspace | 95.07 | 1.90 | 285.21 |
| Community food growing | 2.69 | 1.19 | 47.27 |
| Water | 0.23 | 0.00 | 0.00 |
| | | | |
| Residential urban land | 30.53 | 44.28 | 412.42 |
| Commercial/industrial urban land | 0.00 | 0.00 | 0.00 |
| Greenspace | 10.55 | 0.21 | 31.65 |
| Open urban land | 3.23 | 2.51 | 25.72 |
| **Total:** | **332.908942** | **280.72** | **2987.19** |

**Stage 3 - Impeded Drainage**

**Stage 3**

**User Inputs**

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 13.16 | 19.09 | 177.77 |
| Commercial/industrial urban land | 1.50 | 1.59 | 10.81 |
| Greenspace | 2.32 | 0.05 | 6.96 |
| Open urban land | 2.57 | 2.00 | 20.44 |
| Greenspace | 27.98 | 0.56 | 83.94 |
| Water | 2.00 | 0.00 | 0.00 |
| Water | 3.51 | 0.00 | 0.00 |
| | | | |
| **Total:** | **53.032** | **23.28** | **299.92** |

**Stage 3 - Naturally Wet**

**Stage 3**

**User Inputs**

| New land use type(s) | Area (ha) | Annual phosphorus nutrient export (kg TP) | Annual nitrogen nutrient export (kg TN) |
|---|---|---|---|
| Residential urban land | 98.25 | 142.51 | 1327.23 |
| Community food growing | 0.22 | 0.10 | 3.84 |
| Greenspace | 17.34 | 0.35 | 52.02 |
| Open urban land | 6.26 | 4.87 | 49.85 |
| Greenspace | 60.79 | 1.22 | 182.38 |
| Community food growing | 4.07 | 1.80 | 71.54 |
| Water | 14.96 | 0.00 | 0.00 |
| Water | 8.08 | 0.00 | 0.00 |
| **Total:** | **209.97162** | **150.84** | **1686.86** |

Please enter area in hectares.

# Stage 4 Outputs and Sensitivity Tests

**Stage 4 - Calculated Outputs**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgP/yr) | TN (kgN/yr) | TP (kgP/yr) | TN (kgN/yr) |
| Step 1: Nutrient Budget* | 838.4 | 30007.7 | 791.0 | 27166.0 |
| Step 2: Nutrient Budget* X 1.2 | 1006.1 | 36009.3 | 949.2 | 32599.2 |
| **Stage 4 Final Nutrient Load** | **1006.1** | **36009.3** | **949.2** | **32599.2** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - Land Use Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgP/yr) | TN (kgN/yr) | TP (kgP/yr) | TN (kgN/yr) |
| Step 1: Nutrient Budget* | 235.90 | -6141.43 | 235.90 | -6141.43 |
| Step 2: Nutrient Budget* X 1.2 | 283.08 | -7369.72 | 283.08 | -7369.72 |
| **Stage 4 Final Nutrient Load** | **283.08** | **-7369.72** | **283.08** | **-7369.72** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

**Stage 4 - Calculated Outputs (Sensitivity Test - WwTW Nutrients Only)**

| Total Annual Phosphorous and Nitrogen Load to Mitigate | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP (kgP/yr) | TN (kgN/yr) | TP (kgP/yr) | TN (kgN/yr) |
| Step 1: Nutrient Budget* | 602.49 | 36149.15 | 555.12 | 33307.44 |
| Step 2: Nutrient Budget* X 1.2 | 722.99 | 43378.98 | 666.14 | 39968.93 |
| **Stage 4 Final Nutrient Load** | **722.99** | **43378.98** | **666.14** | **39968.93** |

* Nutrient Budget = Final Stage 1 Output + (Final Stage 3 Output - Final Stage 2 Output)

# Nutrient Mitigation Outputs and Sensitivity Tests

| Nutrient Mitigation - Wetland Area Requirement Summary | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 83.84 | 38.72 | 79.10 | 35.05 |
| | | | | |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - Land Use Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 23.59 | -7.92 | 23.59 | -7.92 |
| | | | | |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

| Nutrient Mitigation - Wetland Area Requirement Summary (Sensitivity Test - WwTW Nutrients Only) | Scenario 1 | | Scenario 2 | |
|---|---|---|---|---|
| | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Final nutrient load/ Assumed Wetland TP/TN removal rate | 60.25 | 46.64 | 55.51 | 42.98 |
| | | | | |
| Assumed Wetland TN removal rate | 93 g/m2/yr | | | |
| Assumed Wetland TP removal rate | 1.2 g/m2/yr | | | |

# Appendix D

## D.1 Nutrient Neutrality Assessment – For Sellindge WwTW alternative permit

Based on the previous communication with the EA (Appendix D.2) and Southern Water (Appendix D.3) and NE during the WCS production, it was confirmed that the nutrient budget calculations for Sellindge WwTW should use a TP permit of 0.3 mg/l and a TN permit of 25 mg/l if the Proposed Development is to be accommodated at an upgraded Sellindge WwTW. NE has previously reviewed Arcadis nutrient budget assessments based these permit levels and had raised no objections to use them. Therefore, this Appendix summarises the Nutrient Neutrality calculations associated with this potential alternative permit levels for comparison.

*Table 25 WwTW TP and TN permit option*

| Description | Offsite (Sellindge) WwTW |
|---|---|
| TN permit | 25 mg/l |
| TP permit | 0.3 mg/l |
| 90% of the proposed consent TN limit[1] | 22.5 |
| 90% of the proposed consent TP limit[1] | 0.27 |

Stage 1

Table 26 shows the Annual Wastewater TP and TN load by the OPA based on the TP and TN Permit levels for Sellindge WwTW against the two PCC water usage rates scenarios.

*Table 26 Total Annual Wastewater TP and TN Load from the Sellindge WwTW alternative Option within OPA*

| Description | Sellindge WwTW Scenario 1 | | Sellindge WwTW Scenario 2 | |
|---|---|---|---|---|
| | Annual wastewater TP load (kg/ TP/year) | Annual wastewater TN load (kg/ TN/year) | Annual wastewater TP load (kg/ TP/year) | Annual wastewater TN load (kg/ TN/year) |
| Class C3 | 223.1 | 18591.4 | 223.1 | 18591.4 |
| Class C2 | 53.4 | 4452.6 | 40.2 | 3345.8 |
| Class C1 | 6.9 | 576.9 | 5.2 | 432.7 |
| **OPA Final Stage 1 Output** | **283.5** | **23620.9** | **268.4** | **22369.9** |

Table 27 shows Annual Wastewater TP and TN load for the additional 44.29ha area covered by the FMP, as described in Section 3.1.

*Table 27 Additional Total Annual Wastewater TP and TN Load from the Sellindge WwTW Option within FMP*

| Description | Sellindge WwTW Scenario 1 | | Sellindge WwTW Scenario 2 | |
|---|---|---|---|---|
| | Annual wastewater TP load (kg/ TP/year) | Annual wastewater TN load (kg/ TN/year) | Annual wastewater TP load (kg/ TP/year) | Annual wastewater TN load (kg/ TN/year) |
| Class C3 | 24.1 | 2009.4 | 24.1 | 2009.4 |
| Class C2 | 53.9 | 4494.0 | 40.5 | 3376.9 |
| Class C1 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Additional FMP Final Stage 1 Output** | **78.0** | **6503.4** | **64.6** | **5386.4** |

Stage 4

Table 28 gives a summary of the total estimated nutrient budgets for both the OPA and FMP, as described in Section 3.1.

*Table 28 Nutrient Budget Assessment Summary for Sellindge WwTW Option*

| WwTW Option | Loading Area Coverage | Combined Load From WwTW and Land Use | | Sensitivity Test - WwTW Load Only | | Sensitivity Test - Land Use Load Only | |
|---|---|---|---|---|---|---|---|
| | | TP (Kg/year) | TN (Kg/year) | TP (Kg/year) | TN (Kg/year) | TP (Kg/year) | TN (Kg/year) |
| Sellindge WwTW - PCC Scenario 1 | Otterpool OPA Area Loading | 594.3 | 20887.0 | 340.14 | 28345.03 | 254.21 | -7458.02* |
| | Extra Otterpool FMP Area Loading | 122.52 | 7892.42 | 93.65 | 7804.12 | 28.87 | 88.31 |
| | **TOTAL** | **716.82** | **28779.42** | **433.79** | **36149.15** | **283.08** | **-7369.71** |
| Sellindge WwTW - PCC Scenario 2 | Otterpool OPA Area Loading | 576.3 | 19385.8 | 322.13 | 26843.82 | 254.21 | -7458.02 |
| | Extra Otterpool FMP Area Loading | 106.43 | 6551.93 | 77.56 | 6463.62 | 28.87 | 88.31 |
| | **TOTAL** | **682.73** | **25937.73** | **399.69** | **33307.44** | **283.08** | **-7369.71** |

*Negative values mean that there is a net reduction in nutrients and there is no need to provide any offsetting mitigation measures

Nutrient Mitigation requirements

Table 29 below summarises the indicative total area of the new wetlands required to offset the nutrient budget shown in Table 28 gives a summary of the total estimated nutrient budgets for both the OPA and FMP, as described in Section 3.1.

Table 28 and Table 29 show that the WwTW load and wetland requirement, based on the Sellindge permit levels are nearly two times higher than the Onsite WwTW option and significantly increases the total load to be mitigated for the OPA and FMP areas.

*Table 29 Mitigation Wetland Requirement Summary for Sellindge WwTW Option*

| WwTW Option | Loading Area Coverage | Combined Load From WwTW and Land Use | | Sensitivity Test - WwTW Load Only | | Sensitivity Test - Land Use Load Only | |
|---|---|---|---|---|---|---|---|
| | | TP [1] Wetland Area (ha) | TN [2] Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) | TP Wetland Area (ha) | TN Wetland Area (ha) |
| Sellindge WwTW – PCC Scenario 1 | Otterpool OPA Area Loading | 49.53 | 22.47 | 28.35 | 30.48 | 21.19 | -8.01[3] |
| | Extra Otterpool FMP Area Loading | 10.21 | 8.49 | 7.80 | 8.39 | 2.41 | 0.09 |
| | **TOTAL** | **59.74** | **30.96** | **36.15** | **38.87** | **23.6** | **-7.92** |
| Sellindge WwTW - PCC Scenario 2 | Otterpool OPA Area Loading | 48.03 | 20.85 | 26.84 | 28.86 | 21.19 | -8.01 |
| | Extra Otterpool FMP Area Loading | 8.87 | 7.05 | 6.45 | 6.95 | 2.41 | 0.09 |
| | **TOTAL** | **56.9** | **27.9** | **33.29** | **35.81** | **23.6** | **-7.92** |

[1] Assumed TN removal rate of 93 g/m$^2$/yr for both wastewater and stormwater discharges, which is a well-accepted figure as a Median Removal rate.

[2] Assumed TP removal rate of 1.2 g/m$^2$/yr for both wastewater and stormwater discharges, which is a well-accepted figure as a Median Removal rate.

[3] Negative values mean that there is a net reduction in nutrients and there is no need to provide any offsetting mitigation measures

Implications

As discussed under Section 6.1, the latest Sellindge WwTW mitigation requirements can only be compared to the previous combined load (WwTWs and Land Use) in the previous WCS report. As seen in Table 30, the latest NE guidance has had a significant increase on the wetland areas required for this option (> 13 ha) to achieve nutrient neutrality. This also means that the total wetland area requirement is now 59.74 ha for the FMP out of which 36.15 ha will be required to treat wastewater discharge and the remaining 23.6 ha will be required to treat the land use runoff discharges, for the worst-cast PCC Scenario 1. Therefore, it is still not considered a suitable viable option for this development as it requires significant offsite wetland mitigation.

*Table 30 Differences in total wetland area requirements for FMP*

| Nutrient Mitigation - Wetland Area Requirement Summary | PCC Rate – Scenario 1 | | PCC Rate – Scenario 2 | |
|---|---|---|---|---|
| | Wetland for Area TP (ha) | Wetland for Area TN (ha) | Wetland for Area TP (ha) | Wetland for Area TN (ha) |
| Difference in previous WCS report Wetland areas against latest wetland areas – FMP Area | -13.34* | -1.05 | -13.30 | -1.09 |

*Negative values here mean that there has been an increase in wetland area when comparing the wetland areas from the previous WCS against the latest wetland areas calculated in this assessment.

## D.2 EA Planning Advice

## Blount-Powell, Elliot

**From:** Kenway, Robert <robert.kenway@environment-agency.gov.uk>
**Sent:** 20 April 2018 17:03
**To:** KSL Enquiries
**Cc:** Wilson, Jennifer; Gunasekara, Renuka
**Subject:** RE: KSL 81610 LB FW: KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request
**Attachments:** Otterpool indicative standards.docx

**Importance:** High

**Categories:** Red Category

Laura, I attach a document showing the results of modelling I carried out for Renuka at Arcadis. I have copied Renuka in on this response as I am aware of urgency for a meeting next week. I hope the information is useful.

Renuka raised some questions beyond modelling. My responses to these are below.

Point 3c. of 12 Jan email.

> c) If Southern Water is prepared to treat the final effluent to a much higher quality standard than at present at Sellindge WwTW and send back a portion of the extra treated effluent to Otterpool Park development for non-potable water recycling purpose (say 30% or 50% of the treated flow volume) then what are the relaxed permit conditions compared to (b) above in order to reflect the reduced extra DWF discharge to the receiving water environment on the East Stour. I appreciate that this would be subject to further discussion and agreement with Southern Water but I was wondering if you could provide some initial advice to facilitate such discussions and inform our WCS report?

The effect on permit conditions would depend on the permitted discharge retained. They would be somewhere in-between the values quoted for Sellindge above and the current permit (12 mg/L annual for BOD). An approximation based on proportions would be give an indication.

Note that there may be restrictions on what use such reused effluent may be put as it would still carry bacteriological and other contamination.

As you have noted, detailed discussions would be necessary with SWS to further this proposal.

Point 2. of 12 Jan email.

> What is the current DWF headroom available with the existing permit at West Hythe WwTW? Also, the quality parameters of the existing coastal discharge permit are currently less stringent than Sellindge WwTW. The additional environmental capacity available combined with minimal extra flood risk impact etc., it seems currently more favourable to accommodate Otterpool development at West Hythe WwTW but your views on this would be useful.

We do not hold accurate figures for available headroom at West Hythe WWTW. I am of the opinion however that the headroom would be insufficient for the large volumes of effluent you estimate for the Otterpool development. As a consequence, as described in our previous response a review of the permit would be likely to be required to determine whether further treatment, including microbiological is required. Headroom should be discussed in detail with SWS.

In general terms, whilst lower levels of treatment may be possible at West Hythe (than inland), and this might make it appear a preferable discharge option, there are considerable benefits to the inland discharge options from a hydrological point of view. This does of course depend on high levels of treatment being provided. We commented to this effect in our previous response.

Regards,

Robert

Robert Kenway
Environment Planning Specialist
Kent, South London & East Sussex Area - Integrated Environment Planning
✉ Orchard House, Endeavour Park, London Road, West Malling, Kent, ME19 5SH
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**Did you know? Over a quarter of a million homes in England and Wales are pouring their dirty water straight into our rivers and streams. Find out more here.**

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**From:** KSL Enquiries
**Sent:** 10 April 2018 12:12
**To:** Kenway, Robert <robert.kenway@environment-agency.gov.uk>
**Subject:** KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request

Hello Rob

Are you able to help with the customer's questions below?

Please respond by 17/04/2018.

Many thanks
Laura

**Laura Buschini**
**Customers & Engagement Officer**
**Kent South London & East Sussex**

**Environment Agency** | 0208 4746848 | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH

DO YOU KNOW WHAT TO I

**From:** Gunasekara, Thushyantha [mailto:renuka.gunasekara@arcadis.com]
**Sent:** 29 March 2018 22:26
**To:** KSL Enquiries <KSLE@environment-agency.gov.uk>; Wilson, Jennifer <jennifer.wilson@environment-agency.gov.uk>
**Subject:** RE: KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request

Hi Laura/ Jennifer,

Thank you for the responses.

I have a few further queries/requests on the information provided.

- 1st point on my second email dated 16th Jan (i.e. Details of any existing licenced surface water and ground water abstractions within or near Otterpool Park Site, including those within the rest of Shepway District)

  For some reason, you have forgotten to attach the stated spreadsheet and please forward this missing spreadsheet.

- 3rd point on my first email dated 12th Jan (i.e. Discharge permits to the East Stour)

  a) The estimated Dry Weather Flow (DWF) for up to 10,000 new homes associated with Otterpool wider masterplan is approximately 2,841 m3/day (i.e. assuming a PCC of 90 l/p/day with extra 30% allowance for any infiltration) but this will increase to 3,472 m3/day if we were to assume a higher PCC of 110 l/p/day. So, please indicate the likely new permit parameters for discharging both DWF figure scenarios (2,841 m3/day and 3,472 m3/day ) from an onsite WwTW.

  b) Similarly, would it be possible to indicate the likely new discharge permit conditions associated with accommodating the above same DWFs (plus any other known committed sites in the existing catchment) to an upgraded Southern Water's Sellindge WwTW? Also what is the current DWF headroom available with the existing permit at Sellindge WwTW?

  c) If Southern Water is prepared to treat the final effluent to a much higher quality standard than at present at Sellindge WwTW and send back a portion of the extra treated effluent to Otterpool Park development for non-potable water recycling purpose (say 30% or 50% of the treated flow volume) then what are the relaxed permit conditions compared to (b) above in order to reflect the reduced extra DWF discharge to the receiving water environment on the East Stour. I appreciate that this would be subject to further discussion and agreement with Southern Water but I was wondering if you could provide some initial advice to facilitate such discussions and inform our WCS report?

- 2nd point on my first email dated 12th Jan (i.e. Discharge via West Hythe WwTW)

  What is the current DWF headroom available with the existing permit at West Hythe WwTW? Also, the quality parameters of the existing coastal discharge permit are currently less stringent than Sellindge WwTW. The additional environmental capacity available combined with minimal extra flood risk impact etc., it seems currently more favourable to accommodate Otterpool development at West Hythe WwTW but your views on this would be useful.

Please note that Otterpool Park Framework Masterplan was published last week with press releases issued to local, national and trade media. You can find both the Framework Masterplan
and the report on the website http://www.otterpoolpark.org/project-information/, which will provide some additional information on our emerging project proposals.

Finally, it would be very useful if we can have your additional responses by mid-April or late-April (at the latest) to inform the next steps. Please confirm the timescale and any charges associated with providing the requested new discharge permit requirements. As you are aware, we already have an agreed cost recovery mechanism with the Environment Agency for Otterpool project (see attached FYI) and I assume we can use this framework to cover your costs if necessary?

Kind regards
Renuka

**Renuka Gunasekara** | Technical Director | Renuka.Gunasekara@arcadis.com
**Arcadis Consulting (UK) Ltd** | Crystal Court, Aston Cross Business Village | 50 Rocky Lane, Aston | Birmingham, B6 5RQ, UK
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**www.arcadis.com**




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**From:** KSL Enquiries <KSLE@environment-agency.gov.uk>
**Sent:** 27 February 2018 13:12
**To:** Renuka Gunasekara <renuka.gunasekara@arcadis.com>
**Subject:** KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request
**Importance:** High

Dear Renuka

**RE: KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request**

Thank you for your enquiry which was received on 12 January 2018.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please see last word document attached KSL 72905 LB Arcadis questions. Please also find attached relevant emails and deocuments.

Our planning department will contact you directly regarding the last 3 questions from your second email.

Please refer to the Open Government Licence which explains the permitted use of this information.

Please be aware that many of our datasets are now available online. Simply visit **environment.data.gov.uk**

If you have any further queries or if you'd like us to review the information we have provided under the Freedom of Information Act 2000 and Environmental Information Regulations 2004 please contact us within two months and we will happily do this for you.

We would be really grateful if you could spare five minutes to help us improve our service. Please click on the link below and fill in our survey – we use every piece of feedback we receive:http://www.smartsurvey.co.uk/s/EnvironmentAgencyCustomerSurvey/?a=KSL

Kind regards
Laura

**Laura Buschini**
**Customers & Engagement Officer**
**Kent South London & East Sussex**

**Environment Agency** | 0208 4749353 | Jabber 49353 | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH



---

**From:** KSL Enquiries
**Sent:** 22 February 2018 09:55
**To:** 'renuka.gunasekara@arcadis.com' <renuka.gunasekara@arcadis.com>
**Subject:** KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request
**Importance:** High

Dear Renuka

Thank you for your enquiry which was received on 12 January 2018.

I have been in contact with our planning department and we are currently collating the information from our teams. Apologies there will be a delay in providing the information requested.

We have provided the information for the question below.

1. Existing discharge permit details for Southern Water's West Hythe Wastewater Treatment Works (WwTW) located @ NGR E 612665, N 133120 and Sellindge WwTW located @ NGR E 608600 N 138200, including the location of existing discharge points.

We are aiming to provide the rest of the information early next week.

Kind regards
Laura

**Laura Buschini**
**Customers & Engagement Officer**
**Kent South London & East Sussex**

**Environment Agency** | 0208 4749353 | Jabber 49353 | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH

**From:** KSL Enquiries
**Sent:** 09 February 2018 17:09
**To:** 'renuka.gunasekara@arcadis.com' <renuka.gunasekara@arcadis.com>
**Subject:** KSL 72905 LB FW: Otterpool Park Garden Town - EA Planning Advice & Data Request
**Importance:** High

Dear Renuka

Thank you for your enquiry which was received on 12 January 2018.

We are currently collating information from our teams and apologies, there will be a delay in providing the information requested.

We have provided the information for the question below which we received via three Environmental permit requests. I have attached the email responses which contain the permits.

1. Existing discharge permit details for Southern Water's West Hythe Wastewater Treatment Works (WwTW) located @ NGR E 612665, N 133120 and Sellindge WwTW located @ NGR E 608600 N 138200, including the location of existing discharge points.

We will aim to provide the rest of the information as soon as we can.

Kind regards
Laura

**Laura Buschini**
**Customers & Engagement Officer**
**Kent South London & East Sussex**

**Environment Agency** | 0208 4749353 | Jabber 49353 | Orchard House | Endeavour Park | London Road | West Malling | Kent | ME19 5SH



**From:** Renuka Gunasekara [mailto:renuka.gunasekara@arcadis.com]
**Sent:** 12 January 2018 20:46
**To:** Wilson, Jennifer <jennifer.wilson@environment-agency.gov.uk>
**Cc:** Aimee Hart <Aimee.Hart@arcadis.com>
**Subject:** Otterpool Park Garden Town - EA Planning Advice & Data Request

Hi Jennifer,

Hope that you're well.

Please see below a specific request for your urgent attention to inform our Otterpool WCS preparation.

2. Existing discharge permit details for Southern Water's West Hythe Wastewater Treatment Works (WwTW) located @ NGR E 612665, N 133120 and Sellindge WwTW located @ NGR E 608600 N 138200, including the location of existing discharge points.

3. What future permit levels are likely to be imposed by the Environment Agency if the proposed Otterpool Garden Park Site, which may accommodate up to 10,000 homes is also to be treated at West Hythe WwTW? If this information is not readily available would the Environment Agency currently have any significant water quality or flood risk concerns due to the additional wastewater flows from West Hythe WwTW due to the proposed Otterpool Garden Park Site and any other new growth in this specific wastewater catchment?

4. What future permit levels are likely to be imposed by the Environment Agency if the proposed Otterpool Garden Park Site would have an onsite WwTW with a potential discharge point to the River East Stour (@ NGR E 609426, N 137712) subject to satisfactorily meeting any downstream flood risk concerns? Please note that potential flood mitigation measures that we can consider may include provision of large effluent polishing wetlands for the WwTW, a range of onsite infiltration and attenuation SuDS measures, rainwater and/or treated wastewater effluent reuse, active low management measures.

5. If the Environment Agency is currently unable to provide the information for item 3 above, can the WFD/ water quality data be provided for us to assess the potential impact of the growth at Otterpool Park Garden Site due to onsite WwTW discharge. I have attached an example dataset, to outline the data required but if you have any specific queries my colleague, Aimee Hart can assist you on this specific query.

    - **Water Quality Data**- Monitored water quality data (to include BOD, phosphorous, ammonia etc.) for the watercourses in the location of both discharge points (ideally upstream and downstream of the discharge point). Both the mean values and standard deviation values are required. Please include the mean, 90%ile and SWD Good Status midpoint values for BOD, phosphorous and ammonia to use where water quality is less than good or where there is no data available.
    - **Flow data-** Q95 exceedance flow and mean flow data for the all WRC discharge point locations.

A quick response to the above would be much appreciated as we are now entering a critical phase of the WCS as the development masterplan and planning strategy is becoming more clearer now.

As WCS work progresses, we may need to request additional information and advice. We will keep our requests to a minimum, but consistent with performing a thorough analysis.

Regards
Renuka

**Renuka Gunasekara** | Technical Director | Renuka.Gunasekara@arcadis.com
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Environment Agency KSLES area

Integrated Environment Planning Team

Response to query KSL 81610 LB dated 10 April 2018

Request for indicative discharge permit standards relating to new Otterpool Park Garden Town development sewage effluent

Response date 20 April 2018.

**All results provided are indicative only and for assistance with Otterpool Park Framework Master planning process. The results provided are subject to review upon submission and determination of a permit application.**

Options Tested

1. Effluent treated at existing Sellindge wwtw (Southern Water Services; SWS), discharging to Horton Priory Dyke (HPD) tributary of East Stour,
2. Effluent treated at new wwtw discharging to East Stour 1 km upstream of HPD confluence,
3. Effluent treated at new wwtw discharging to East Stour at HPD confluence.

Results for both 'Lower' and 'Upper' effluent volumes have been requested.

1. Sellindge wwtw. @ 608600 138200
   Targets used in modelling: Equivalent impact on the HPD as allowed by the current permit to ensure no deterioration and also a proposed PR19 phosphorus improvement scheme (achieve good status in East Stour).

   Dry weather flow (DWF) of current permit increased to accommodate flows from Otterpool development. Allowance made for headroom at Sellindge – based on current DWF and an estimate of long term (2045) 'committed to' growth at the WWTW. An accurate assessment should be requested from SWS. We have estimated headroom for the purposes of these calculations as 558 m3/day. Resulting Lower (Sellindge) DWF = 3877 m3/day; Upper DWF = 4508 m3/day

   Seasonal look up table BOD limits in current permit converted to annual for the purposes of these calculations. Permit: 8 mg/L summer, 15 mg/L winter. Converted to 12 mg/L annual.

2. New WWTW to East Stour upstream of HPD confluence. @ 609426 137712
   Targets: 3% deterioration from present quality in East Stour at this point.
   Lower (Otterpool) DWF = 2841 m3/day; Upper DWF = 3472 m3/day.
   Sellindge WWTW current permit unaltered.

3. New WWTW discharge to East Stour at HPD confluence. @ 608558 138047
   This option investigated due to very stringent standards resulting from option 2 above.
   Targets. Equivalent impact on the East Stour using the permitted impact of Sellindge WWTW as a baseline from which to ensure no deterioration.
   Proposed PR19 P scheme also used as baseline.
   Lower (Otterpool) DWF = 2841 m3/day; Upper DWF = 3472 m3/day.
   Sellindge WWTW current permit unaltered.

Information sources used in modelling:
Permitted DWF at Sellindge.
Estimate of Otterpool 'Lower' and 'Upper' DWF provided by Arcadis consulting.
Qm and Q95 in HPD and East Stour
Sellindge effluent quality monitoring point Ref E0001437.
Horton Priory Dyke monitoring point u/s Sellindge wwtw Ref E0001432; 'HORTON PRIORY DYKE RAILWAY BRIDGE'
East Stour monitoring point u/s HPD confluence Ref E0001424; 'EAST STOUR HARRINGE COURT'
Sellindge WWTW Ref E0001437; 'SELLINDGE SEWAGE TREATMENT WORKS FINAL EFFLUENT'

Results:

Results provided as Look Up Table/Upper Tier limits for BOD and Ammonia and mean limits for phosphorus. Upper Tier limits are standard Environment Agency 'read across' values.

| | BOD mg/L | | Ammonia mg/L | | Phosphorus mg/L | |
|---|---|---|---|---|---|---|
| DWF | Lower | Upper | Lower | Upper | Lower | Upper |
| Sellindge wwtw | 8/45 | 8/45 | 2/12 | 2/12 | 0.3 | 0.3 |
| E Stour U/S | 5/20 | * | 0.5/12 | * | 0.1 | * |
| E Stour/HPD | 8/45 | 7/44 | 2/12 | 2/12 | 0.3 | 0.3 |

* Not calculated due to very stringent limits calculated for lower DWF

Lower (Otterpool) DWF = 2841 m3/day; Upper DWF = 3472 m3/day. Note equivalent DWF at Sellindge would be 3877 (Lower) and 4508 (Upper) m3/day.

R Kenway

20 April 2018

## D.3 Southern Water Advice