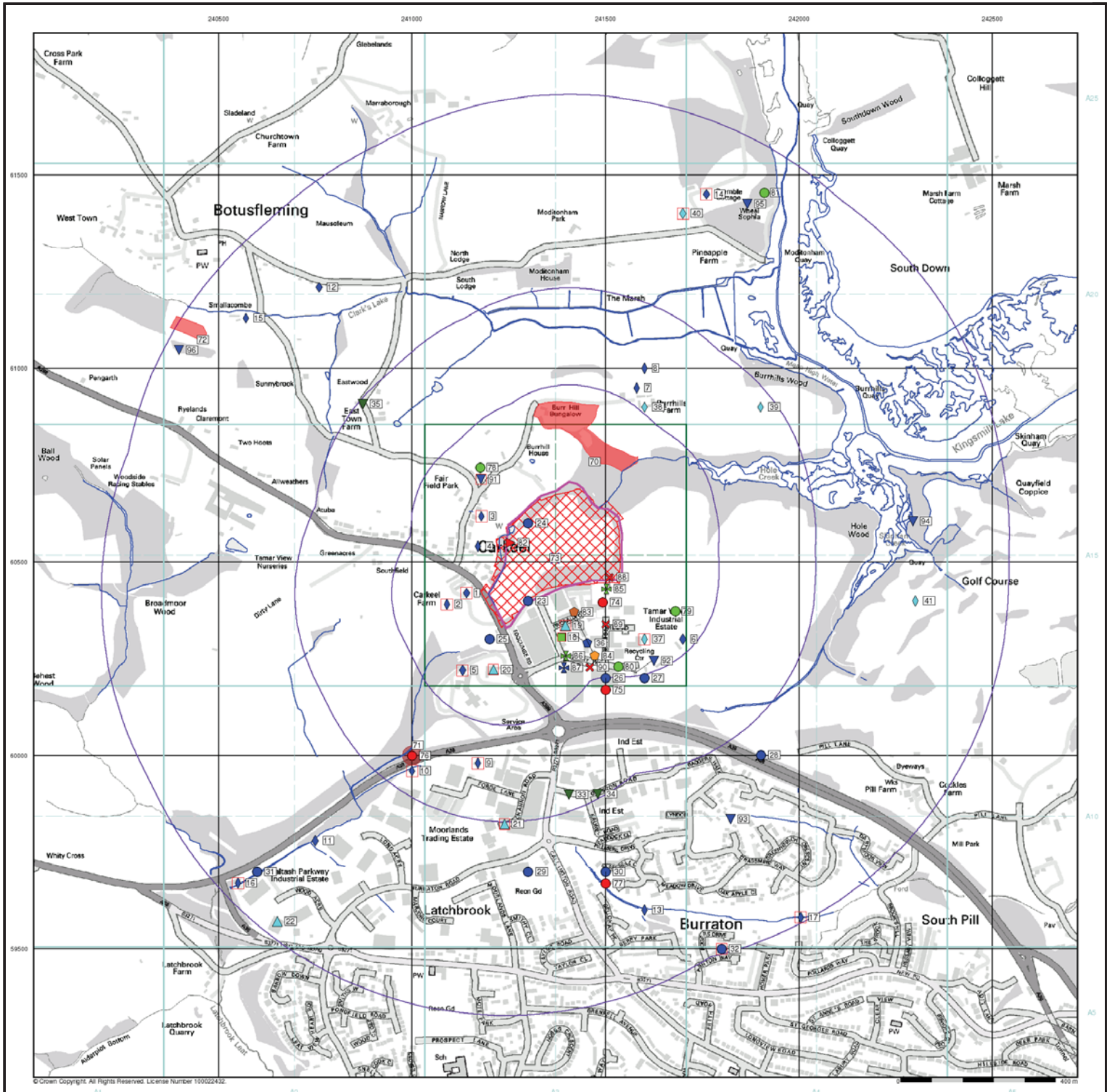


Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

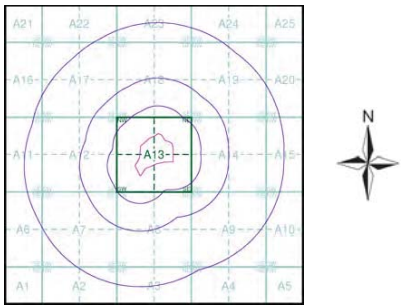
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Slice A



Order Details

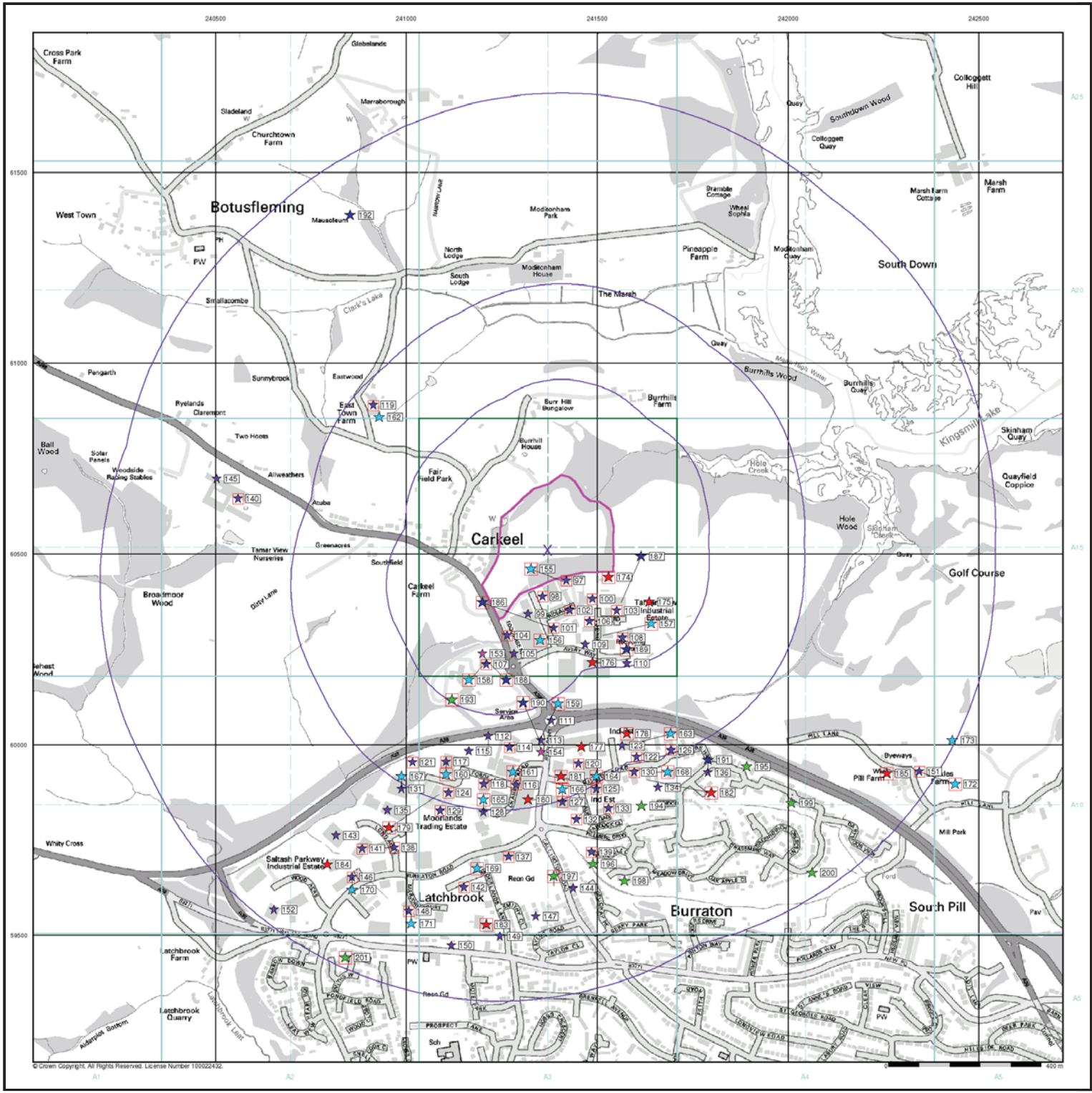
Order Number:	92525376_1_1
Customer Ref:	GCE00692
National Grid Reference:	241370, 60510
Slice:	A
Site Area (Ha):	7.38
Search Buffer (m):	1000

Site Details

Certini Bicycle Co, Tamar View Industrial Estate, SALTASH, Cornwall, PL12 6LD

Landmark Information Group

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



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Industrial Land Use Map

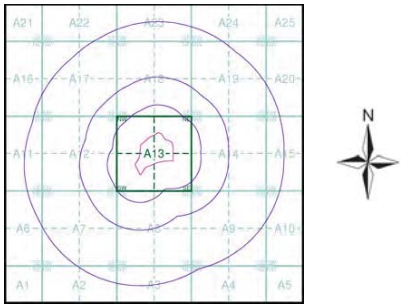
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- Gas Pipeline
- Points of Interest - Commercial Services
- Points of Interest - Education and Health
- Points of Interest - Manufacturing and Production
- Points of Interest - Public Infrastructure
- Points of Interest - Recreational and Environmental
- Underground Electrical Cables

Industrial Land Use Map - Slice A



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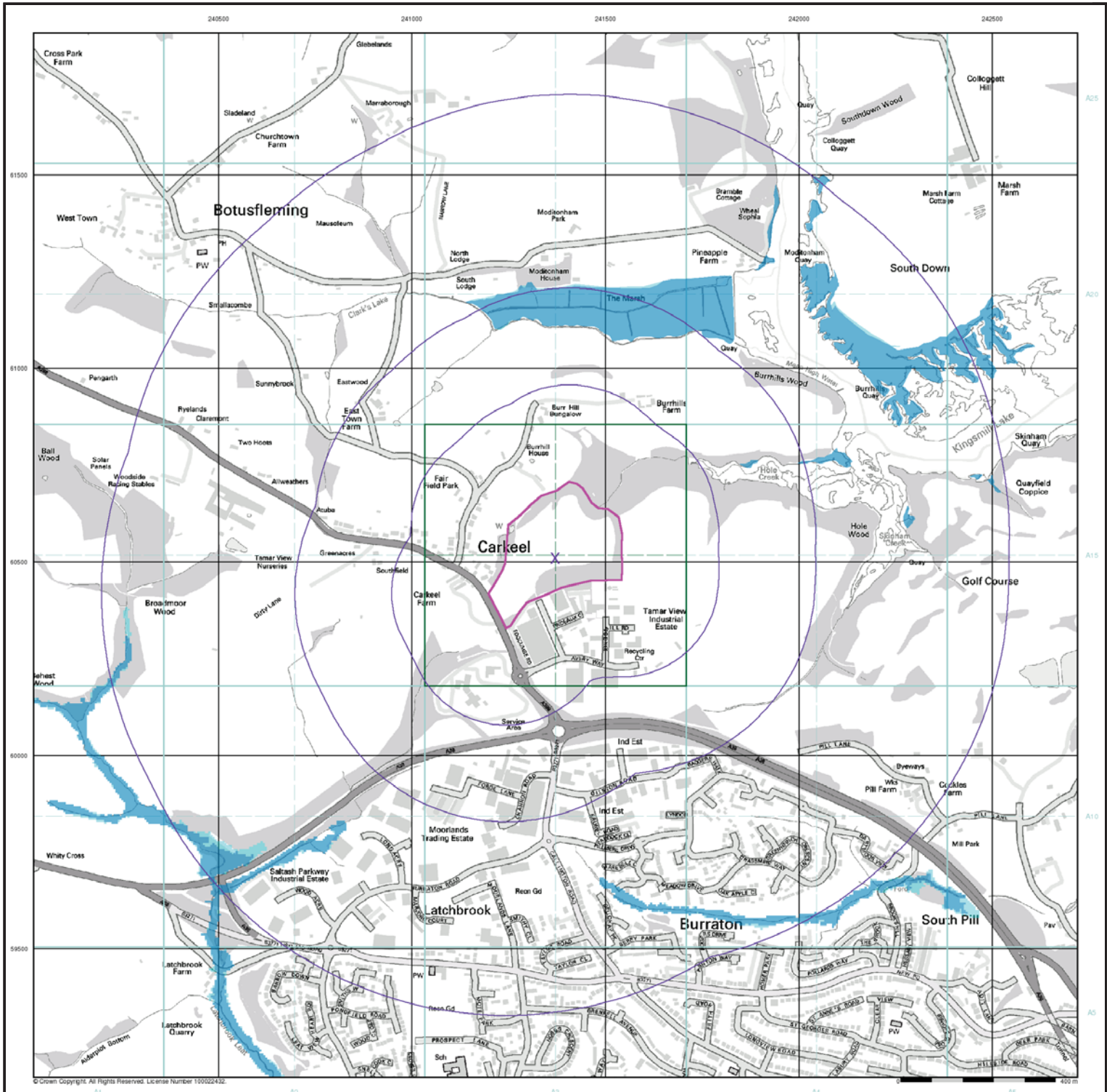


Envirocheck®

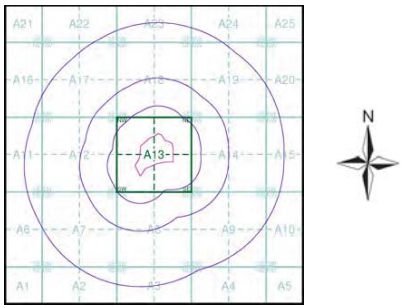
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



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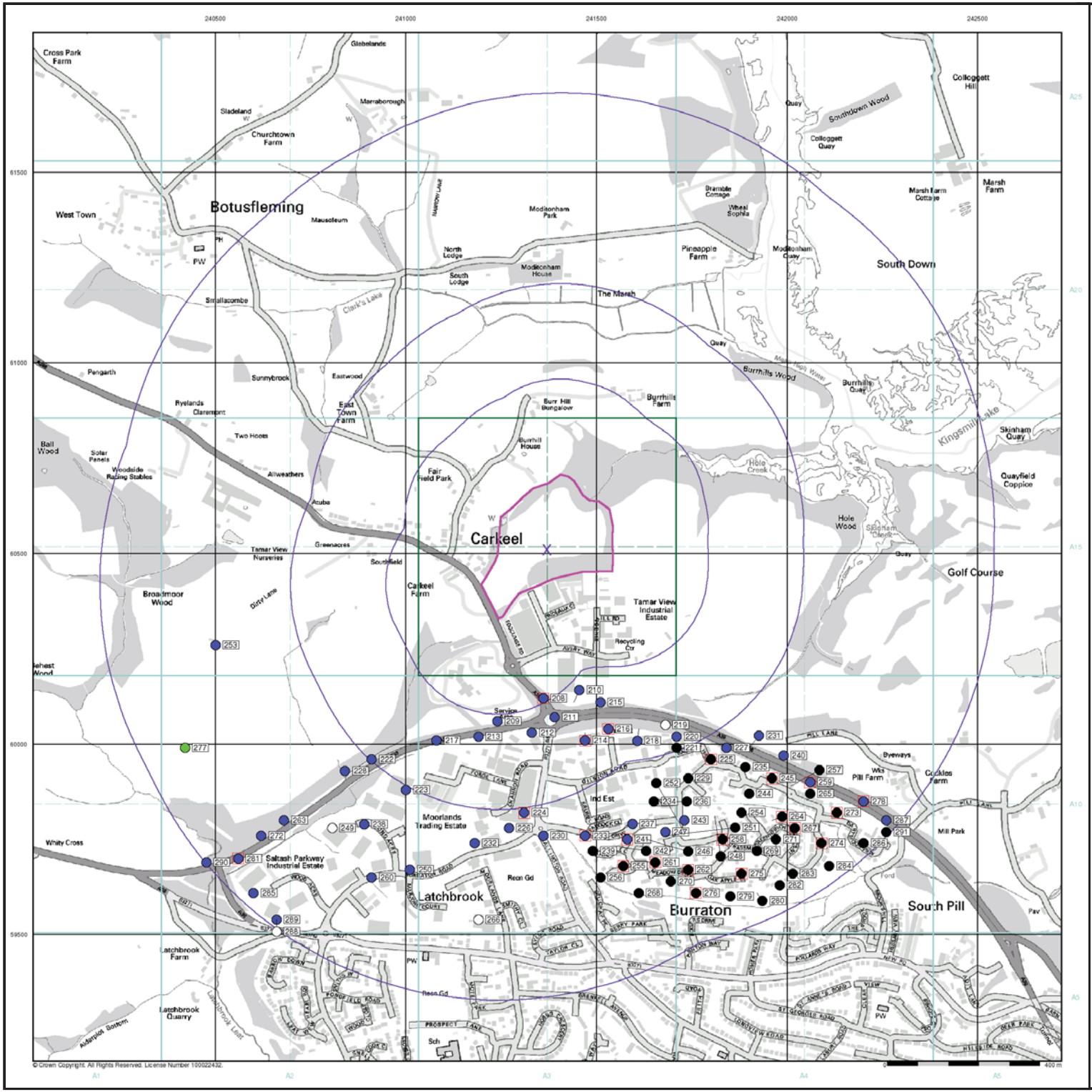


General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

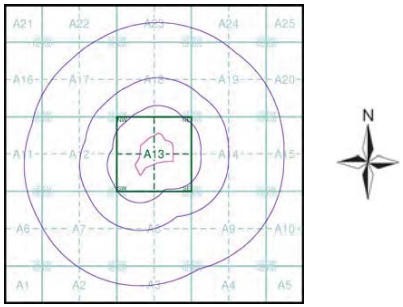
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



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Search Buffer (m):	1000

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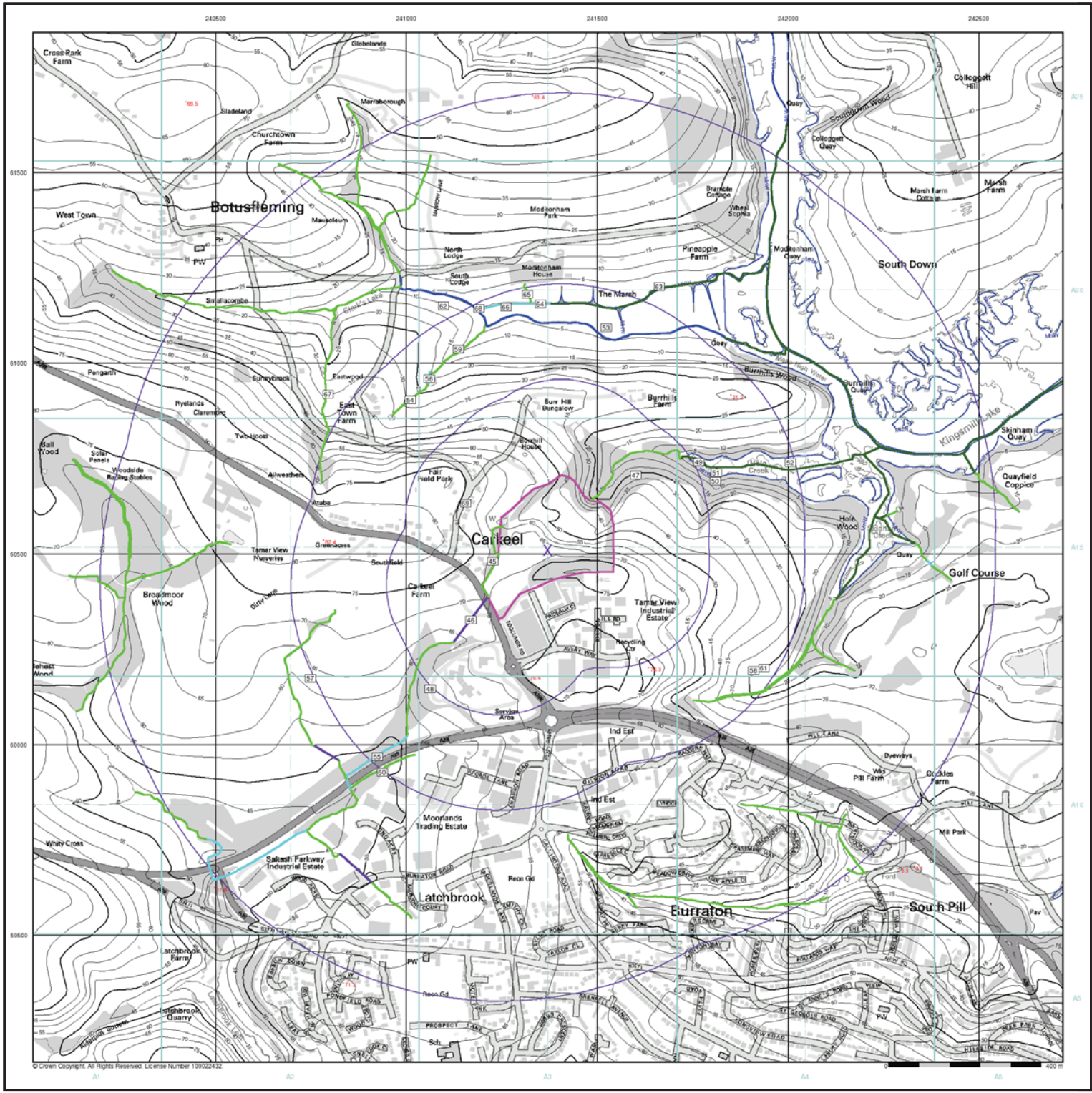


Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (height in metres)

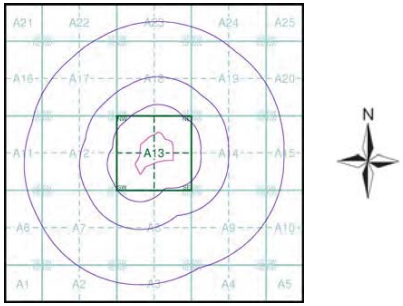
Standard Contour — 105 — 100 — 95

Master Contour

Spot Height *167.3

- MLW Mean Low Water
- MHW Mean High Water

EA/NRW Detailed River Network Map - Slice A



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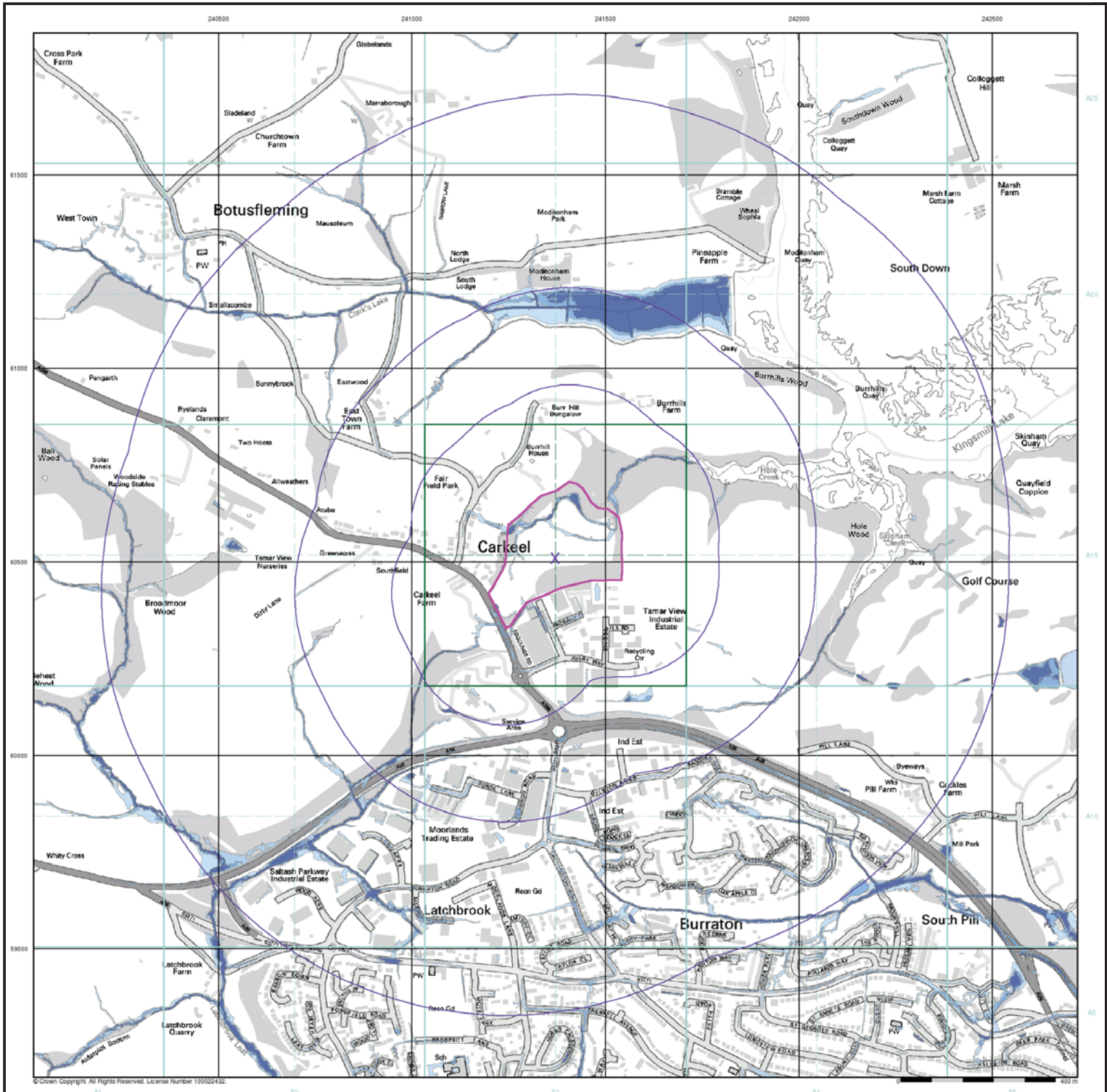


General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Risk of Flooding from Surface Water

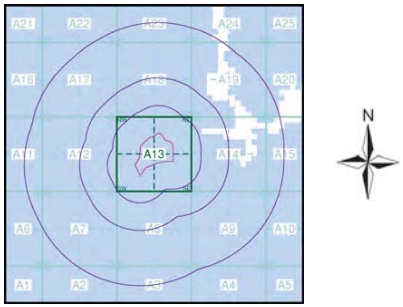
- High - 30 Year Return
- Medium - 100 Year Return
- Low - 1000 Year Return

Suitability

See the suitability map below

- National to county
- County to town
- Town to street
- Street to parcels of land
- Property

EA/NRW Suitability Map - Slice A



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Slice:	A
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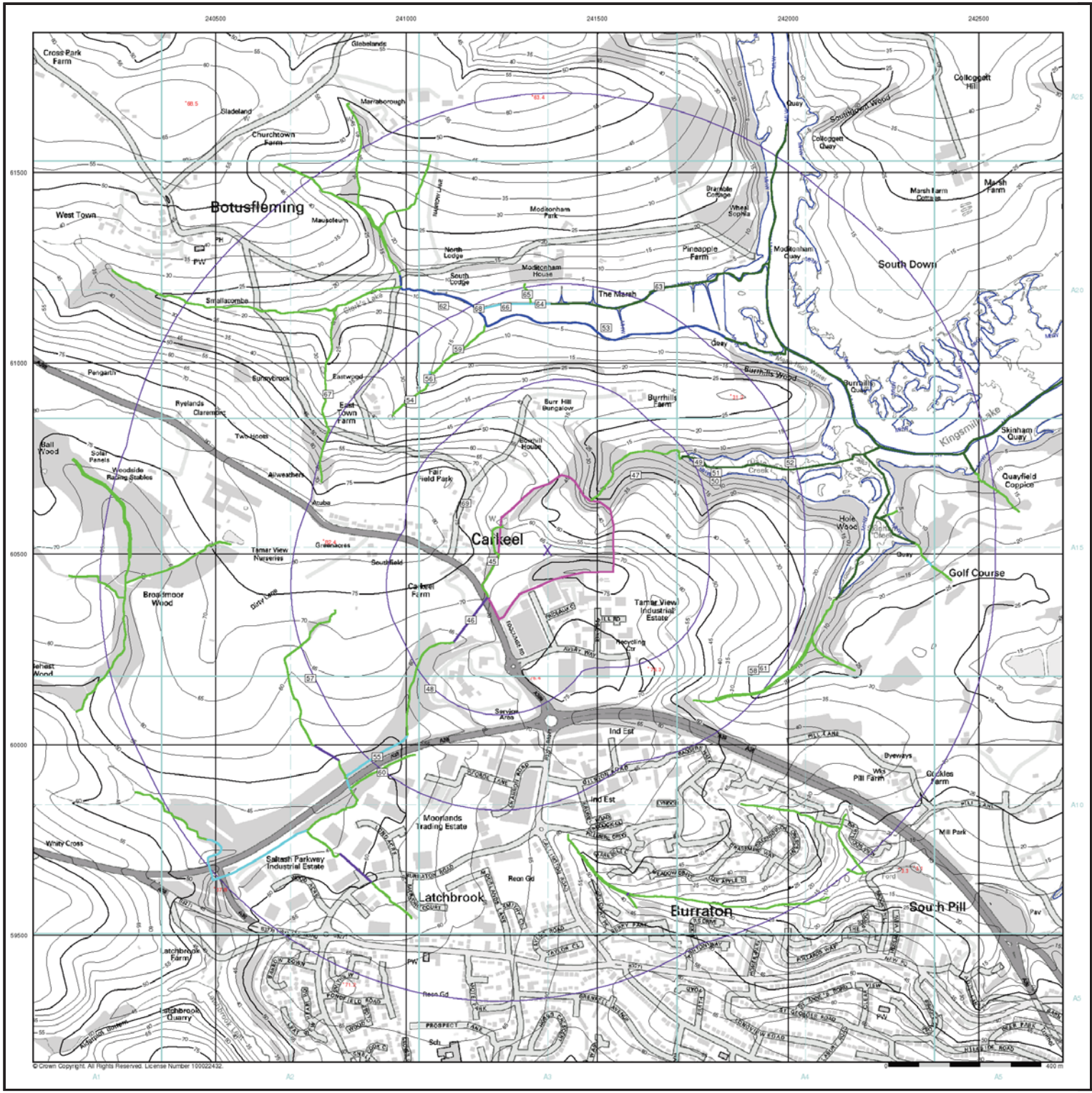


Envirocheck®

General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (height in metres)

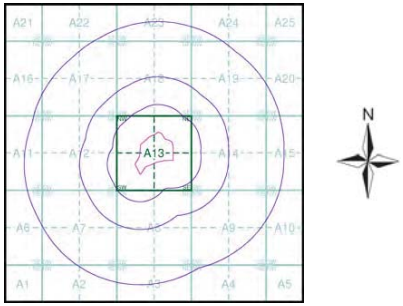
Standard Contour — 105 — 100 — 95

Master Contour

Spot Height *167.3

- MLW Mean Low Water
- MHW Mean High Water

EA/NRW Detailed River Network Map - Slice A



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Slice:	A
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Site Details

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Web: www.envirocheck.co.uk

Appendix H Magic Map Outputs

MAGiC

Magic Map

Legend

Sites of Special Scientific Interest Units (England)

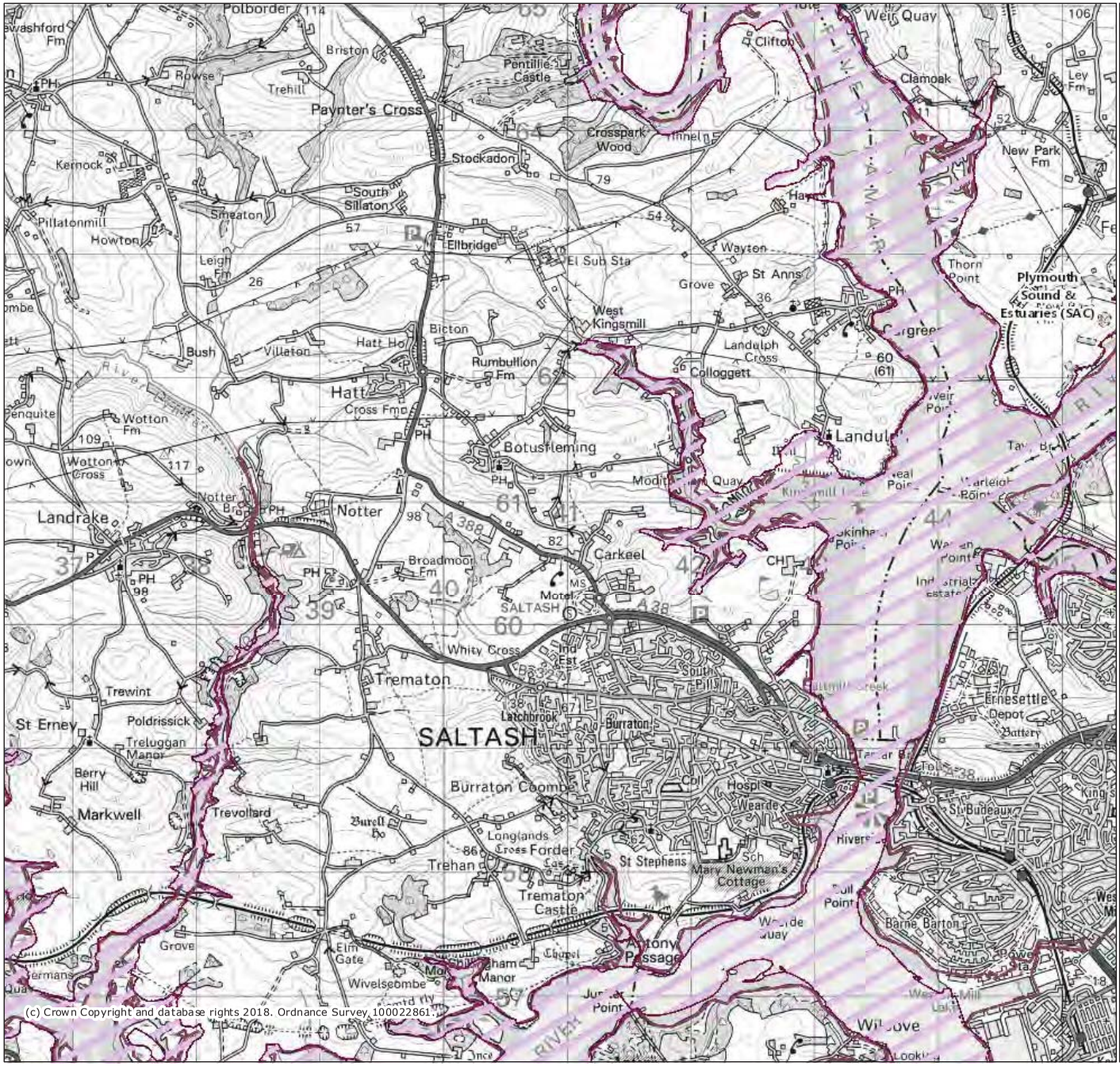
- Favourable Condition
- Unfavourable Recovering
- Unfavourable no change
- Unfavourable Declining
- Part Destroyed
- Destroyed
- Not Assessed

Projection = OSGB36
xmin = 234800
ymin = 58010
xmax = 247100
ymax = 63480

0 0.7 1.4
km

Map produced by MAGIC on 2 July, 2018.

Magic Map



Legend

Special Areas of Conservation (England)

Projection = OSGB36
xmin = 234800
ymin = 58010
xmax = 247100
ymax = 63480

0 0.7 1.4
km

Map produced by MAGIC on 2 July, 2018.
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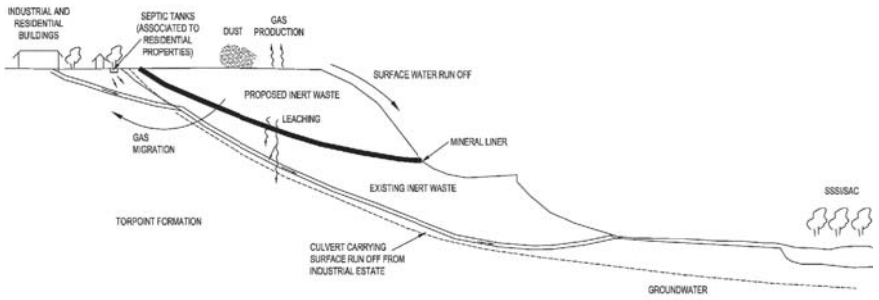
Appendix I Horizon Drawings

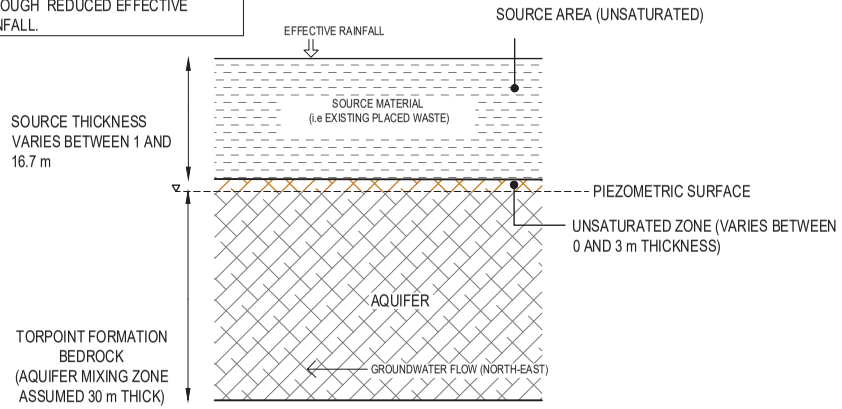
NOTES: GENERAL

1. DO NOT SCALE FROM THIS DRAWING
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT SCHEME DRAWINGS AND SPECIFICATIONS



INDICATIVE CROSS-SECTION
(DEVELOPED FROM DRAWINGS IN GCE EESD)

NOTE:
LOW PERMEABILITY CLAY LAYER TO BE OVER SURFACE OF MAJORITY OF EALES FARM LANDFILL PRIOR TO PLACEMENT OF WASTE (TAMAR VIEW LANDFILL). CLAY LAYER TAKEN INTO ACCOUNT THROUGH REDUCED EFFECTIVE RAINFALL.



INDICATIVE CROSS-SECTION THROUGH SITE CONCEPTUAL MODEL (EALES FARM LANDFILL MODEL) AS VISUALISED IN CONSIM MODEL

Rev	Description	Drn	Chk	Date
A	Minor updates to drawing details	JH	AL	06.20

REVISIONS

Preliminary		Approval		Tender		Const.	

DRAWING STATUS

DATE	DRAWN	CHECKED	ISSUE CHECKBOX
JULY '18	JH	AL	

DRAWING No.	REV	SCALE	
0430–01.RevA	A	N.T.S	@ A3

Horizon Consulting Engineers
The Dairy Barn, Westpoint Crt, Sidmouth Rd, Exeter EX5 1DJ
T: 01392 363364 www.horizon–ce.co.uk

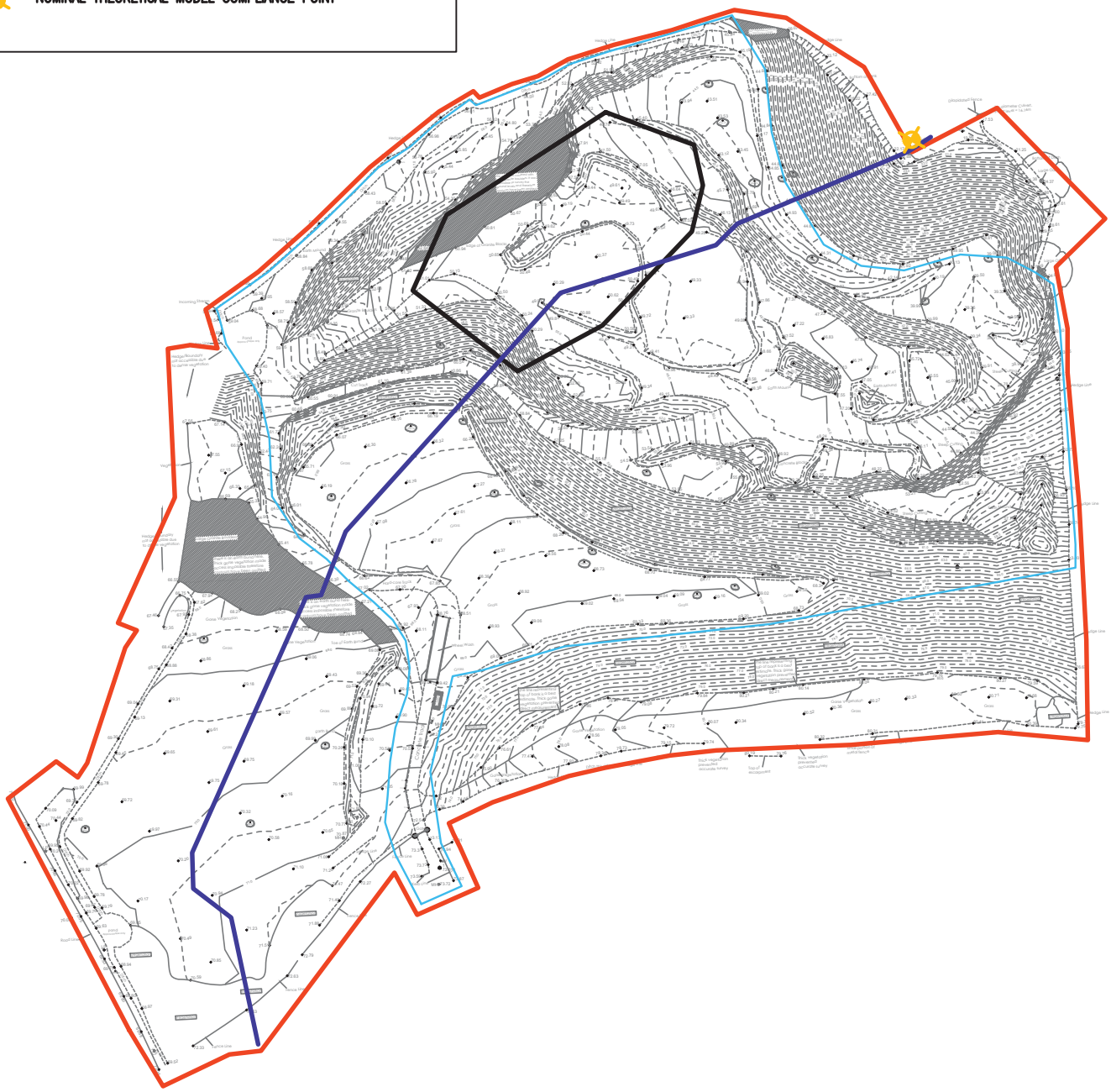
TAMAR VALLEY PROJECTS LTD

JOB TITLE
PROPOSED EALES FARM LANDFILL EXTENSION
HYDROGEOLOGICAL RISK ASSESSMENT

DRAWING TITLE
FIGURE 1
SITE CONCEPTUAL MODEL (EXISTING EALES FARM LANDFILL)

KEY:

- EXISTING SITE BOUNDARY (ASSUMED EALES LANDFILL AREA)
- PROPOSED BOUNDARY OF EALES FARM LANDFILL EXTENSION
- HYDROCARBON HOTSPOT AREA
- APPROXIMATE LINE OF CULVERT
- NOMINAL THEORETICAL MODEL COMPLIANCE POINT



NOTES: GENERAL

1. DO NOT SCALE FROM THIS DRAWING.
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Rev	Description	Drn	Chk	Date
A	Minor updates to drawing details	JH	AL	06.20

REVISIONS

Horizon Consulting Engineers
The Dairy Barn, Westpoint Crt, Sidmouth Rd, Exeter EX5 1DJ
T: 01392 363364
www.horizon-ce.co.uk

TAMAR VALLEY PROJECTS LTD

JOB TITLE
PROPOSED EALES FARM LANDFILL EXTENSION
HYDROGEOLOGICAL RISK ASSESSMENT

DRAWING TITLE
CONCEPTUAL LAYOUT FOR MODELLING PURPOSES

DWG No.	REV.	DATE	DRAWN	CHECKED	SCALE	
0430-01.RevA	A	JULY '18	JH	AL	–	@ A4

NOTES: GENERAL

1. DO NOT SCALE FROM THIS DRAWING
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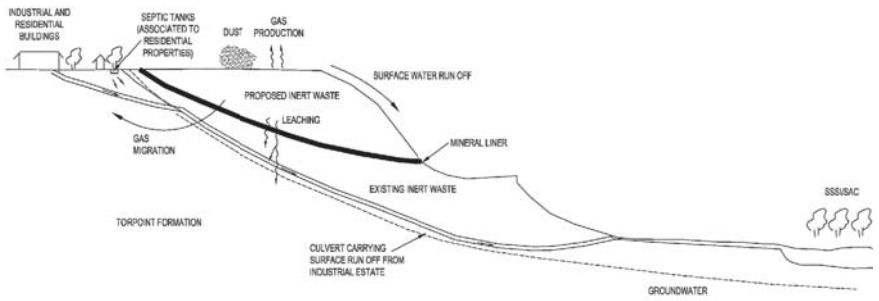
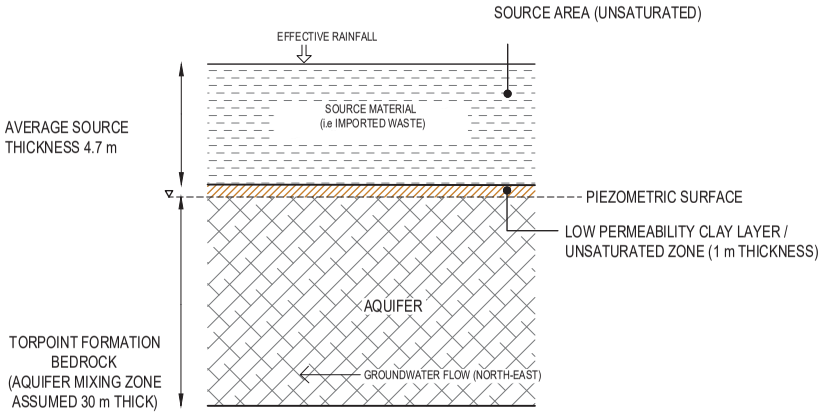


INDICATIVE CROSS-SECTION
(DEVELOPED FROM DRAWINGS IN GCE ESSD)



INDICATIVE CROSS-SECTION THROUGH SITE CONCEPTUAL MODEL (PROPOSED EALES FARM LANDFILL EXTENSION MODEL) AS VISUALISED IN CONSIM MODEL

Rev	Description	Drn	Chk	Date
A	Minor updates to drawing details	JH	AL	06.20

REVISIONS

Preliminary		Approval		Tender		Const.	

DRAWING STATUS

DATE	DRAWN	CHECKED	ISSUE CHECKBOX
JULY '18	JH	AL	

DRAWING No.	REV	SCALE	
0430-03.RevA	A	N.T.S	@ A3

Horizon Consulting Engineers
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T: 01392 363364 www.horizon-ce.co.uk

TAMAR VALLEY PROJECTS LTD

JOB TITLE
PROPOSED EALES FARM LANDFILL EXTENSION
HYDROGEOLOGICAL RISK ASSESSMENT

DRAWING TITLE
FIGURE 3
SITE CONCEPTUAL MODEL (PROPOSED LANDFILL EXTENSION)

Appendix J Landfill Models

Summary of Outputs for Eales Farm

[Model Available Upon Request]

Project: Eales Farm Landfill Model - Main Source Area

Project Number: HCE0430

Project Details

Title: Eales Farm Landfill Model - Main Source Area

Project Number: HCE0430

Prepared By: Alex Large

Date: 2020-06-10 19:39:40

Client Name: Tamar Valley Projects Ltd

Comments:

Model of existing Site (Eales Farm Landfill) conditions excluding hydrocarbon hotspot taking into account reduced infiltration due to cap placed as part of proposed Tamar Valley Landfill.

Consim version 2.05

Simulation Level

Level 3

Simulation Parameters

Iterations 1001

Timeslices:100, 1000

Water Quality Standard

EQS (Freshwater) (* quoted as lower value in range)

Source

Eales Farm Landfill
Dry Bulk Density [g/cm³] UNIFORM(1.7,2)
Air Filled Porosity [fraction] NORMAL(0.2,0.02)
Water Filled Porosity [fraction] NORMAL(0.1,0.01)
Thickness [m] SINGLE(7)
Contaminated Land
Constant Source Term

Overall Unsaturated Zone Thickness [m] UNIFORM(0,3)

Infiltration

Infiltration [mm/year] NORMAL(404.8,40.5)

Source Inventory:

Ammonium (NH4+)
Measured as Leachable Concentrate — Leachate Concentration [mg/l] UNIFORM(0.01,6.6)
Inorganic

Arsenic
Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(103,294)
Inorganic
Partition Coefficient [ml/g] TRIANGULAR(29,117,250)
Maximum Solubility [mg/l] NORMAL(441000,44100)

Cadmium
Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(0.34,0.54)
Inorganic
Partition Coefficient [ml/g] LOGNORMAL(240,247.3)
Maximum Solubility [mg/l] NORMAL(651000,65100)

Chromium
Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(37,19)
Inorganic
Partition Coefficient [ml/g] SINGLE(35)
Maximum Solubility [mg/l] NORMAL(167000,16700)

Copper
Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(99,131)
Inorganic
Partition Coefficient [ml/g] TRIANGULAR(40,127,295)
Maximum Solubility [mg/l] NORMAL(293000,29300)

Lead

Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(130,133)
Inorganic
Partition Coefficient [ml/g] NORMAL(435,45)
Maximum Solubility [mg/l] NORMAL(0.043,0.0043)

Manganese

Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(1935,639)
Inorganic
Partition Coefficient [ml/g] TRIANGULAR(41,720,130000)
Maximum Solubility [mg/l] NORMAL(930,93)

Mercury

Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(0.29,0.32)
Inorganic
Partition Coefficient [ml/g] LOGNORMAL(450,375)
Maximum Solubility [mg/l] NORMAL(65.7,6.57)

Nickel

Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(54,14)
Inorganic
Partition Coefficient [ml/g] LOGNORMAL(66,2025)
Maximum Solubility [mg/l] NORMAL(173000,17300)

Zinc

Measured as Total Concentration in Soil — Concentration [mg/kg] NORMAL(181,188)
Inorganic
Partition Coefficient [ml/g] TRIANGULAR(1.1,26,420)
Maximum Solubility [mg/l] NORMAL(606000,60600)

Unsaturated Pathway: Unsaturated Pathway 1

Active

Porous Medium

Thickness [m] UNIFORM(0,3)

Dry Bulk Density [g/cm³] UNIFORM(1.8,2.4)

Vertical Dispersivity [m] UNIFORM(0.1,0.3)

Water Filled Porosity [fraction] NORMAL(0.1,0.01)

Unsaturated Conductivity [m/s] TRIANGULAR(5e-009,4.45e-006,8.78e-006)

Unsaturated Pathway Contaminants

Ammonium (NH4+)

Partition Coefficient [ml/g] UNIFORM(0.5,2)

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Arsenic

Partition Coefficient [ml/g] TRIANGULAR(29,117,250)

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Cadmium

Partition Coefficient [ml/g] LOGNORMAL(240,247.3)

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Chromium

Partition Coefficient [ml/g] SINGLE(35)

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Copper

Partition Coefficient [ml/g] TRIANGULAR(40,127,295)

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Lead

Partition Coefficient [ml/g] NORMAL(435,44)

Simulate Degradation in Dissolved and sorbed phases

Halflife [years] SINGLE(9.9e+011)

Manganese

Partition Coefficient [ml/g] TRIANGULAR(3,49,810)

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Mercury
Partition Coefficient [ml/g] LOGNORMAL(450,375)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Nickel
Partition Coefficient [ml/g] LOGNORMAL(66,2025)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Zinc
Partition Coefficient [ml/g] TRIANGULAR(1.1,26,420)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Aquifer Pathway

Thickness [m] SINGLE(30)
Dry Bulk Density [g/cm³] UNIFORM(1.8,2.4)
Calculated Mixing Zone Thickness
Hydraulic Conductivity [m/s] TRIANGULAR(5e-009,4.45e-006,8.78e-006)
Effective Porosity [fraction] UNIFORM(0.21,0.41)
Hydraulic Gradient UNIFORM(0.12,0.14)
Groundwater Flow Direction (degrees), 45.00
Longitudinal Dispersivity [m] TRIANGULAR(1e-009,0.1,1)
Lateral Dispersivity [m] TRIANGULAR(1e-009,0.03,0.3)

Contaminant Inventory

Ammonium (NH4+)
Partition Coefficient [ml/g] UNIFORM(0.5,2)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Arsenic
Partition Coefficient [ml/g] TRIANGULAR(29,117,250)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Cadmium
Partition Coefficient [ml/g] LOGNORMAL(240,247.3)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Chromium
Partition Coefficient [ml/g] SINGLE(35)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Copper
Partition Coefficient [ml/g] TRIANGULAR(40,127,295)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Lead
Partition Coefficient [ml/g] NORMAL(435,43)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Manganese
Partition Coefficient [ml/g] TRIANGULAR(3,49,810)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Mercury
Partition Coefficient [ml/g] LOGNORMAL(450,375)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Nickel
Partition Coefficient [ml/g] LOGNORMAL(66,2025)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Zinc
Partition Coefficient [ml/g] TRIANGULAR(1.1,26,420)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Receptor

Eales Farm Landfill Receptor	X 241513.376690	Y 60669.949402

Input Correlations

Latitudinal and Longtitudinal Conductivity	0.7
Effective Porosity and Hydraulic Gradient	-1
Hydraulic Gradient and Hydraulic Conducitivity	-1

Project: Eales Farm Landfill Model - Hydrocarbon Hotspot

Project Number: HCE0430

Project Details

Title: Eales Farm Landfill Model - Hydrocarbon Hotspot

Project Number: HCE0430

Prepared By: Alex Large

Date: 2020-06-10 20:00:11

Client Name: Tamar Valley Projects Ltd

Comments:

Model of existing Site conditions (hydrocarbon hotspot only) with infiltration reduced to take into account entire area covered by Tamar Valley Landfill..

Consim version 2.05

Simulation Level

Level 3

Simulation Parameters

Iterations 1001

Timeslices:100, 1000

Water Quality Standard

EQS (Freshwater) (* quoted as lower value in range)

Source

Eales Farm Landfill (Hydrocarbon Hotspot)
Dry Bulk Density [g/cm³] UNIFORM(1.7,2)
Air Filled Porosity [fraction] NORMAL(0.2,0.02)
Water Filled Porosity [fraction] NORMAL(0.1,0.01)
Thickness [m] TRIANGULAR(1,3,6)
Fraction of Organic Carbon [%] TRIANGULAR(0.002,0.014,0.052)
Contaminated Land
Constant Source Term

Overall Unsaturated Zone Thickness [m] UNIFORM(0,3)

Infiltration

Infiltration [mm/year] NORMAL(253,25.3)

Source Inventory:

Benzo 3, 4 pyrene

Measured as Total Concentration in Soil
Organic
koc [ml/g] NORMAL(9.16e-005,9.16e-006)
Henry's Law Constant NORMAL(3.43e-005,3.43e-006)

Concentration [mg/kg] TRIANGULAR(0.1,1.5,15)
Calculate kd
Maximum Solubility [mg/l] NORMAL(0.0038,0.00038)

Naphthalene

Measured as Total Concentration in Soil
Organic
koc [ml/g] NORMAL(1290,129)
Henry's Law Constant NORMAL(0.049,0.0049)

Concentration [mg/kg] TRIANGULAR(0.1,0.22,3.5)
Calculate kd
Maximum Solubility [mg/l] NORMAL(32.9,3.29)

TPH Aliphatic C16-C21

Measured as Total Concentration in Soil
Organic
koc [ml/g] NORMAL(6.3e+008,6.3e+007)
Henry's Law Constant NORMAL(4900,490)

Concentration [mg/kg] TRIANGULAR(1,5,54)
Calculate kd
Maximum Solubility [mg/l] NORMAL(3e-006,3e-005)

TPH Aromatic C16-C21

Measured as Total Concentration in Soil
Organic
koc [ml/g] NORMAL(16000,1600)
Henry's Law Constant NORMAL(0.013,0.0013)

Concentration [mg/kg] TRIANGULAR(1,30,500)
Calculate kd
Maximum Solubility [mg/l] NORMAL(0.65,0.065)

TPH Aromatic C21-C35

Measured as Total Concentration in Soil
Organic
koc [ml/g] NORMAL(130000,13000)
Henry's Law Constant NORMAL(0.00067,6.7e-005)

Concentration [mg/kg] TRIANGULAR(1,161,2500)
Calculate kd
Maximum Solubility [mg/l] NORMAL(0.0066,0.00066)

Unsaturated Pathway: Unsaturated Pathway 1

Active

Porous Medium

Thickness [m] UNIFORM(0,3)

Dry Bulk Density [g/cm³] UNIFORM(1.8,2.4)

Vertical Dispersivity [m] UNIFORM(1e-005,0.3)

Fraction of Organic Carbon [%] TRIANGULAR(0.001,0.002,0.003)

Water Filled Porosity [fraction] NORMAL(0.1,0.01)

Unsaturated Conductivity [m/s] TRIANGULAR(5e-009,4.45e-006,8.78e-006)

Unsaturated Pathway Contaminants

Benzo 3, 4 pyrene

koc [ml/g] NORMAL(9.16e-005,9.16e-006) Calculate kd

Simulate Degradation in Dissolved Phase only

Halflife [years] NORMAL(2.9,0.3)

Naphthalene

koc [ml/g] NORMAL(1290,129) Calculate kd

Simulate Degradation in Dissolved Phase only

Halflife [years] UNIFORM(0.55,2.74)

TPH Aliphatic C16-C21

koc [ml/g] NORMAL(6.3e+008,6.3e+007) Calculate kd

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

TPH Aromatic C16-C21

koc [ml/g] NORMAL(16000,1600) Calculate kd

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

TPH Aromatic C21-C35

koc [ml/g] NORMAL(130000,13000) Calculate kd

Simulate Degradation in Dissolved Phase only

Halflife [years] SINGLE(9.9e+011)

Aquifer Pathway

Thickness [m] SINGLE(30)
Dry Bulk Density [g/cm³] UNIFORM(1.8,2.4)
Fraction of Organic Carbon [%] TRIANGULAR(0.001,0.002,0.003)
Calculated Mixing Zone Thickness
Hydraulic Conductivity [m/s] TRIANGULAR(5e-009,4.45e-006,8.78e-006)
Effective Porosity [fraction] UNIFORM(0.21,0.41)
Hydraulic Gradient UNIFORM(0.12,0.14)
Groundwater Flow Direction (degrees), 45.00
Longitudinal Dispersivity [m] TRIANGULAR(1e-009,0.1,1)
Lateral Dispersivity [m] TRIANGULAR(1e-009,0.03,0.3)

Contaminant Inventory

Benzo 3, 4 pyrene
koc [ml/g] NORMAL(9.16e-005,9.16e-006) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] NORMAL(2.9,0.3)

Naphthalene
koc [ml/g] NORMAL(1290,129) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] UNIFORM(0.55,2.74)

TPH Aliphatic C16-C21
koc [ml/g] NORMAL(6.3e+008,6.3e+007) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

TPH Aromatic C16-C21
koc [ml/g] NORMAL(16000,1600) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

TPH Aromatic C21-C35
koc [ml/g] NORMAL(130000,13000) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Project: Eales Farm Landfill Model - Hydrocarbon Hotspot

Project Number: HCE0430

Receptor

Eales Farm Landfill (Hydrocarbon	X 241415.595126	Y 60647.384426

Input Correlations

Latitudinal and Longtitudinal Conductivity	0.7
Effective Porosity and Hydraulic Gradient	-1
Hydraulic Gradient and Hydraulic Conducitivity	-1

Project: Eales Farm Landfill Model - Main Source Area

Project Number: HCE0430

Eales Farm Landfill - Ammonium (NH4+)

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.381664	10% of values less than 0.681731	25% of values less than 1.72533
50% of values less than 3.29364	75% of values less than 5.00836	90% of values less than 5.987
Minimum 0.0106034	Mean 6.28163	Maximum 6.59839
Mean 3.3466	SD 1.91175	Variance 3.65478

Eales Farm Landfill - Arsenic

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.199318	10% of values less than 0.367265	25% of values less than 0.950455
50% of values less than 1.87887	75% of values less than 3.49384	90% of values less than 5.32187
Minimum 0.000384458ก 6.61511	Maximum 15.8197	
Mean 2.47888	SD 2.14863	Variance 4.61661

Eales Farm Landfill - Cadmium

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.000267779	10% of values less than 0.000459184	25% of values less than 0.00109913
50% of values less than 0.00266349	75% of values less than 0.00596382	90% of values less than 0.0109768
Minimum 4.75135E-006 0.0156744	Maximum 0.088001	
Mean 0.00495369	SD 0.00750188	Variance 5.62782E-005

Eales Farm Landfill - Chromium

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.259306	10% of values less than 0.41575	25% of values less than 0.705546
50% of values less than 1.09997	75% of values less than 1.42919	90% of values less than 1.75324
Minimum 0.00982123ɜn 1.96919	Maximum 3.06406	
Mean 1.09117	SD 0.510701	Variance 0.260815

Eales Farm Landfill - Copper

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.0707216	10% of values less than 0.164775	25% of values less than 0.453439
50% of values less than 0.903191	75% of values less than 1.50844	90% of values less than 2.28266
Minimum 0.00131944	an 2.7475	Maximum 7.43785
Mean 1.10612	SD 0.915944	Variance 0.838953

Eales Farm Landfill - Lead

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.034548	10% of values less than 0.0369567	25% of values less than 0.0394561
50% of values less than 0.0425476	75% of values less than 0.0455907	90% of values less than 0.0483729
Minimum 0.000355135ก 0.0500361	Maximum 0.0566992	
Mean 0.0420544	SD 0.00616489	Variance 3.80058E-005

Eales Farm Landfill - Manganese

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.0150427	10% of values less than 0.0188828	25% of values less than 0.0290111
50% of values less than 0.0506973	75% of values less than 0.10277	90% of values less than 0.287747
Minimum 0.000543061ก 0.604715	Maximum 9.9822	
Mean 0.153658	SD 0.466648	Variance 0.217761

Eales Farm Landfill - Mercury

Concentration at Source [mg/l] - 1000 years

05% of values less than 9.88595E-005	10% of values less than 0.000193664	25% of values less than 0.000455164
50% of values less than 0.000950535	75% of values less than 0.00188488	90% of values less than 0.00331922
Minimum 5.2171E-006n 0.00465252	Maximum 0.01428	
Mean 0.00148984	SD 0.00170509	Variance 2.90734E-006

Eales Farm Landfill - Nickel

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.349648	10% of values less than 0.956624	25% of values less than 4.41625
50% of values less than 23.3491	75% of values less than 112.026	90% of values less than 396.664
Minimum 0.0160385	Mean 626.553	Maximum 1316.7
Mean 118.552	SD 214.094	Variance 45836.4

Eales Farm Landfill - Zinc

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.192392	10% of values less than 0.332984	25% of values less than 0.767749
50% of values less than 1.63567	75% of values less than 3.60219	90% of values less than 6.59017
Minimum 0.000132411n 9.73961	Maximum 89.3898	
Mean 3.19686	SD 5.95719	Variance 35.4881

Ammonium (NH4+)

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0.059478	10% of values less than 0.111201	25% of values less than 0.261122
50% of values less than 0.52581	75% of values less than 0.811908	90% of values less than 1.16764
Minimum 0.0013721	an 1.40995	Maximum 3.67353
Mean 0.606844	SD 0.495986	Variance 0.246002

Arsenic

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 1.29786	
Mean 0.0138919	SD 0.0920408	Variance 0.00847152

Cadmium

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 3.44378E-005	Maximum 0.00511967	
Mean 3.01474E-005	SD 0.000218298	Variance 4.7654E-008

Chromium

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0.0624701	75% of values less than 0.148023	90% of values less than 0.231745
Minimum 0ues less than 0.282392	Maximum 0.655165	
Mean 0.0882745	SD 0.103041	Variance 0.0106175

Copper

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.376162	
Mean 0.00354691	SD 0.0263485	Variance 0.000694241

Lead

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.00637171	
Mean 1.02223E-005	SD 0.000235372	Variance 5.54E-008

Manganese

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.213621	
Mean 0.000702461	SD 0.00768149	Variance 5.90053E-005

Mercury

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.000236196	
Mean 9.18854E-007	SD 1.08595E-005	Variance 1.17929E-010

Nickel

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0.151152
50% of values less than 2.03377	75% of values less than 14.0032	90% of values less than 58.2455
Minimum 0ues less than 86.4395	Maximum 375.71	
Mean 17.1825	SD 38.964	Variance 1518.19

Zinc

Concentration at Eales Farm Landfill Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0.142521	Maximum 7.85857	
Mean 0.0356082	SD 0.293813	Variance 0.0863259

Project: Eales Farm Landfill Model - Hydrocarbon Hotspot

Project Number: HCE0430

Eales Farm Landfill (Hydrocarbon Hotspot) - Benzo 3, 4 pyrene

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00318603	10% of values less than 0.00331787	25% of values less than 0.00355513
50% of values less than 0.00378865	75% of values less than 0.00406297	90% of values less than 0.00429848
Minimum 0.00251716an 0.00444864	Maximum 0.00517699	
Mean 0.00380107	SD 0.000385199	Variance 1.48378E-007

Eales Farm Landfill (Hydrocarbon Hotspot) - Naphthalene

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.724232	10% of values less than 1.02183	25% of values less than 1.73247
50% of values less than 3.42104	75% of values less than 5.63264	90% of values less than 8.91892
Minimum 0.230112 than 10.9851	Maximum 28.7157	
Mean 4.29542	SD 3.51963	Variance 12.3878

Eales Farm Landfill (Hydrocarbon Hotspot) - TPH Aliphatic C16-C21

Concentration at Source [mg/l] - 1000 years

05% of values less than 2.08683E-006	10% of values less than 3.93945E-006	25% of values less than 9.36945E-006
50% of values less than 2.0879E-005	75% of values less than 3.35856E-005	90% of values less than 4.90699E-005
Minimum 5.00836E-008 5.81156E-005	Maximum 0.000111849	
Mean 2.37223E-005	SD 1.79512E-005	Variance 3.22246E-010

Eales Farm Landfill (Hydrocarbon Hotspot) - TPH Aromatic C16-C21

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.546197	10% of values less than 0.569497	25% of values less than 0.608844
50% of values less than 0.651921	75% of values less than 0.698705	90% of values less than 0.737052
Minimum 0.457636 than 0.760845	Maximum 0.859674	
Mean 0.652799	SD 0.065744	Variance 0.00432227

Eales Farm Landfill (Hydrocarbon Hotspot) - TPH Aromatic C21-C35

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00551909	10% of values less than 0.0057666	25% of values less than 0.00617155
50% of values less than 0.00662601	75% of values less than 0.00704848	90% of values less than 0.00741428
Minimum 0.00442357an 0.00767546	Maximum 0.00857561	
Mean 0.00660111	SD 0.000652493	Variance 4.25747E-007

Benzo 3, 4 pyrene

Concentration at Eales Farm Landfill (Hydrocarbon Hotspot) Receptor [mg/l] - 1000 years

05% of values less than 1.33324E-006	10% of values less than 1.91551E-005	25% of values less than 0.000140373
50% of values less than 0.000199898	75% of values less than 0.000263374	90% of values less than 0.000342221
Minimum 3.44666E-020 0.000406152	Maximum 0.000792269	
Mean 0.000203526	SD 0.000121936	Variance 1.48685E-008

Naphthalene

Concentration at Eales Farm Landfill (Hydrocarbon Hotspot) Receptor [mg/l] - 1000 years

05% of values less than 0.000711381	10% of values less than 0.0096045	25% of values less than 0.0374208
50% of values less than 0.0947989	75% of values less than 0.204525	90% of values less than 0.374078
Minimum 7.67364E-018 0.558214	Maximum 1.65284	
Mean 0.159784	SD 0.201511	Variance 0.0406068

TPH Aliphatic C16-C21

Concentration at Eales Farm Landfill (Hydrocarbon Hotspot) Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

TPH Aromatic C16-C21

Concentration at Eales Farm Landfill (Hydrocarbon Hotspot) Receptor [mg/l] - 1000 years

05% of values less than 0.000314865	10% of values less than 0.00543972	25% of values less than 0.0356213
50% of values less than 0.0505597	75% of values less than 0.0661861	90% of values less than 0.0929316
Minimum 9.92428E-018 0.113917	Maximum 0.359783	
Mean 0.0535961	SD 0.0366344	Variance 0.00134208

TPH Aromatic C21-C35

Concentration at Eales Farm Landfill (Hydrocarbon Hotspot) Receptor [mg/l] - 1000 years

05% of values less than 3.67543E-006	10% of values less than 4.9336E-005	25% of values less than 0.000367708
50% of values less than 0.00051006	75% of values less than 0.00066947	90% of values less than 0.000953372
Minimum 9.55212E-020 0.00119347	Maximum 0.00446905	
Mean 0.000544799	SD 0.000380831	Variance 1.45032E-007

Appendix K Summary of Outputs for Proposed Eales Farm Landfill Extension Model

[Model Available Upon Request]

Project: Proposed Eales Farm Extension Landfill Model

Project Number: HCE0430

Project Details

Title: Proposed Eales Farm Extension Landfill Model

Project Number: HCE0430

Prepared By: Alex Large

Date: 2020-06-13 14:39:36

Client Name: Tamar Valley Projects Ltd

Comments:

Model of proposed extension to Eales Farm Landfill.

Consim version 2.05

Simulation Level

Level 3

Simulation Parameters

Iterations 1001

Timeslices:100, 1000

Water Quality Standard

EQS (Freshwater) (* quoted as lower value in range)

Source

Proposed Eales Farm Landfill Extension Model
Dry Bulk Density [g/cm³] UNIFORM(1.7,2)
Air Filled Porosity [fraction] NORMAL(0.2,0.02)
Water Filled Porosity [fraction] NORMAL(0.1,0.01)
Thickness [m] SINGLE(4.7)
Fraction of Organic Carbon [%] TRIANGULAR(0.002,0.014,0.052)
Contaminated Land
Constant Source Term

Overall Unsaturated Zone Thickness [m] SINGLE(1)

Infiltration

Infiltration [mm/year] NORMAL(506,50.6)

Source Inventory:

Ammonium (NH4+)
Measured as Leachable Concentrate — Leachate Concentration [mg/l] UNIFORM(0.01,6.6)
Inorganic

Arsenic
Measured as Leachable Concentrate — Leachate Concentration [mg/l] UNIFORM(0.0025,0.05)
Inorganic

Benzo 3, 4 pyrene
Measured as Total Concentration in Soil — Concentration [mg/kg] UNIFORM(0.04,50)
Organic
Partition Coefficient [ml/g] NORMAL(9.16e-005,9.16e-006)
Henry's Law Constant NORMAL(3.43e-005,3.43e-006) — Maximum Solubility [mg/l] NORMAL(0.0038,0.00038)

Cadmium
Measured as Leachable Concentrate — Leachate Concentration [mg/l] UNIFORM(0.0005,0.004)
Inorganic

Chromium
Measured as Leachable Concentrate — Leachate Concentration [mg/l] UNIFORM(0.0015,0.05)
Inorganic

Copper
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.007,0.2)

Lead
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.005,0.05)

Manganese
Measured as Total Concentration in Soil
Inorganic
Partition Coefficient [ml/g] TRIANGULAR(3,49,810)
Maximum Solubility [mg/l] NORMAL(930,93)
Concentration [mg/kg] NORMAL(1935,639)

Mercury
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] SINGLE(0.001)

Naphthalene
Measured as Total Concentration in Soil
Organic
Partition Coefficient [ml/g] NORMAL(1290,129)
Henry's Law Constant NORMAL(0.049,0.0049)
Concentration [mg/kg] UNIFORM(0.04,50)
Maximum Solubility [mg/l] NORMAL(32.9,3.3)

Nickel
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.002,0.04)

Zinc
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.003,0.4)

Chloride
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.3,80)

Fluoride
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.3,1)

Phenol
Measured as Leachable Concentrate
Organic
Leachate Concentration [mg/l] UNIFORM(0.01,0.1)

Selenium
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.003,0.01)

Sulphate (as S042-)
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.5,100)

TPH Aliphatic C5-C6
Measured as Total Concentration in Soil
Organic
Concentration [mg/kg] UNIFORM(0.1,500)
koc [ml/g] NORMAL(790,79)
Calculate kd
Henry's Law Constant NORMAL(33,3.3)
Maximum Solubility [mg/l] NORMAL(36,3.6)

Barium
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.003,2)

Antimony
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.002,0.006)

Molybdenum
Measured as Leachable Concentrate
Inorganic
Leachate Concentration [mg/l] UNIFORM(0.002,0.05)

Unsaturated Pathway: Unsaturated Pathway 1

Active
Porous Medium
Thickness [m] SINGLE(1)
Dry Bulk Density [g/cm³] UNIFORM(1.8,2.4)
Vertical Dispersivity [m] SINGLE(0.1)
Fraction of Organic Carbon [%] TRIANGULAR(0.001,0.002,0.003)
Water Filled Porosity [fraction] NORMAL(0.1,0.01)
Unsaturated Conductivity [m/s] SINGLE(1e-009)

Unsaturated Pathway Contaminants

Ammonium (NH4+)
Partition Coefficient [ml/g] UNIFORM(0.5,2)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Arsenic
Partition Coefficient [ml/g] TRIANGULAR(29,117,249.6)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Benzo 3, 4 pyrene
koc [ml/g] NORMAL(9.16e-005,9.16e-006) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] NORMAL(2.9,0.3)

Cadmium
Partition Coefficient [ml/g] LOGNORMAL(240,247.3)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Chromium
Partition Coefficient [ml/g] SINGLE(35)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Copper
Partition Coefficient [ml/g] TRIANGULAR(40,127,295)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Lead
Partition Coefficient [ml/g] NORMAL(435,43)
Simulate Degradation in Dissolved and sorbed phases
Halflife [years] SINGLE(9.9e+011)

Manganese
Partition Coefficient [ml/g] TRIANGULAR(3,49,810)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Mercury
Partition Coefficient [ml/g] LOGNORMAL(450,375)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Naphthalene
koc [ml/g] NORMAL(1290,129) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] UNIFORM(0.55,2.74)

Nickel
Partition Coefficient [ml/g] LOGNORMAL(66,2025)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Zinc
Partition Coefficient [ml/g] TRIANGULAR(1.1,26,420)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Chloride
Partition Coefficient [ml/g] SINGLE(0)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Fluoride
Partition Coefficient [ml/g] NORMAL(0.8,0.08)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Phenol
Partition Coefficient [ml/g] UNIFORM(0.22,2.2)
Simulate Degradation in Dissolved and sorbed phases
Halflife [years] UNIFORM(0.14,0.82)

Selenium
Partition Coefficient [ml/g] NORMAL(9.5,0.95)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Sulphate (as S042-)
Partition Coefficient [ml/g] SINGLE(0)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

TPH Aliphatic C5-C6
koc [ml/g] NORMAL(790,79) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] NORMAL(120,12)

Barium
Partition Coefficient [ml/g] LOGNORMAL(1.4,4.1)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Antimony
Partition Coefficient [ml/g] NORMAL(45,4.5)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Molybdenum
Partition Coefficient [ml/g] NORMAL(110,11)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Aquifer Pathway

Thickness [m] SINGLE(30)
Dry Bulk Density [g/cm³] UNIFORM(1.8,2.4)
Fraction of Organic Carbon [%] TRIANGULAR(0.001,0.002,0.003)
Calculated Mixing Zone Thickness
Hydraulic Conductivity [m/s] TRIANGULAR(5e-009,4.45e-006,8.78e-006)
Effective Porosity [fraction] UNIFORM(0.21,0.41)
Hydraulic Gradient UNIFORM(0.12,0.14)
Groundwater Flow Direction (degrees), 45.00
Longitudinal Dispersivity [m] TRIANGULAR(1e-009,0.1,1)
Lateral Dispersivity [m] TRIANGULAR(1e-009,0.03,0.3)

Contaminant Inventory

Ammonium (NH4+)
Background Concentration [mg/l] NORMAL(0.607,0.496)
Partition Coefficient [ml/g] UNIFORM(0.5,2)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Arsenic
Background Concentration [mg/l] NORMAL(0.0139,0.092)
Partition Coefficient [ml/g] TRIANGULAR(29,117,249.6)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Benzo 3, 4 pyrene
Background Concentration [mg/l] NORMAL(0.000204,0.000122)
koc [ml/g] NORMAL(9.16e-005,9.16e-006) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] NORMAL(2.9,0.3)

Cadmium
Background Concentration [mg/l] NORMAL(3.01e-005,0.000218)
Partition Coefficient [ml/g] LOGNORMAL(240,247.3)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Chloride
Partition Coefficient [ml/g] SINGLE(0)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Chromium
Background Concentration [mg/l] NORMAL(0.0883,0.103)
Partition Coefficient [ml/g] SINGLE(35)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Copper
Background Concentration [mg/l] NORMAL(0.00355,0.0263)
Partition Coefficient [ml/g] TRIANGULAR(40,127,295)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Fluoride
Partition Coefficient [ml/g] NORMAL(0.8,0.08)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Lead
Background Concentration [mg/l] NORMAL(1.02e-005,0.000235)
Partition Coefficient [ml/g] NORMAL(435,43)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Manganese
Background Concentration [mg/l] NORMAL(0.000702,0.00768)
Partition Coefficient [ml/g] TRIANGULAR(3,49,810)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Mercury
Background Concentration [mg/l] NORMAL(9.19e-007,1.09e-005)
Partition Coefficient [ml/g] LOGNORMAL(450,375)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Naphthalene
Background Concentration [mg/l] NORMAL(0.16,0.202)
koc [ml/g] NORMAL(1290,129) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] UNIFORM(0.55,2.74)

Nickel
Background Concentration [mg/l] NORMAL(17.2,39)
Partition Coefficient [ml/g] LOGNORMAL(66,2025)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Phenol
koc [ml/g] UNIFORM(0.22,2.2) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] UNIFORM(0.14,0.82)

Selenium
Partition Coefficient [ml/g] NORMAL(9.5,0.95)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Sulphate (as S042-)
Partition Coefficient [ml/g] SINGLE(0)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Zinc
Background Concentration [mg/l] NORMAL(0.0356,0.294)
Partition Coefficient [ml/g] TRIANGULAR(1.1,26,420)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

TPH Aliphatic C5-C6
koc [ml/g] NORMAL(790,79) Calculate kd
Simulate Degradation in Dissolved Phase only
Halflife [years] NORMAL(120,12)

Barium
Partition Coefficient [ml/g] LOGNORMAL(1.4,4.1)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Antimony
Partition Coefficient [ml/g] NORMAL(45,4.5)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Molybdenum
Partition Coefficient [ml/g] NORMAL(110,11)
Simulate Degradation in Dissolved Phase only
Halflife [years] SINGLE(9.9e+011)

Receptor

Proposed Eales Farm Landfill ExteX 241533.170529ptor	Y 60604.233857

Input Correlations

Latitudinal and Longtitudinal Conductivity	0.7
Effective Porosity and Hydraulic Gradient	-1
Hydraulic Gradient and Hydraulic Conducitivity	-1

Project: Proposed Eales Farm Extension Landfill Model

Project Number: HCE0430

Proposed Eales Farm Landfill Extension Model - Ammonium (NH4+)

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.314089	10% of values less than 0.641507	25% of values less than 1.69818
50% of values less than 3.39379	75% of values less than 4.97719	90% of values less than 5.93511
Minimum 0.0297095	Mean 6.31482	Maximum 6.59598
Mean 3.34665	SD 1.90786	Variance 3.63994

Proposed Eales Farm Landfill Extension Model - Arsenic

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00480636	10% of values less than 0.00739685	25% of values less than 0.0154698
50% of values less than 0.0276496	75% of values less than 0.039122	90% of values less than 0.0464194
Minimum 0.00253624an 0.0484199	Maximum 0.0499638	
Mean 0.0272601	SD 0.0138737	Variance 0.000192481

Proposed Eales Farm Landfill Extension Model - Benzo 3, 4 pyrene

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00315621	10% of values less than 0.00328806	25% of values less than 0.00353985
50% of values less than 0.00380314	75% of values less than 0.00406216	90% of values less than 0.00427281
Minimum 0.00265894	an 0.00442279	Maximum 0.00508303
Mean 0.00379445	SD 0.000382023	Variance 1.45942E-007

Proposed Eales Farm Landfill Extension Model - Cadmium

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00068276	10% of values less than 0.000828883	25% of values less than 0.00136274
50% of values less than 0.00217037	75% of values less than 0.00307776	90% of values less than 0.00369568
Minimum 0.00050267an 0.00384373	Maximum 0.00399786	
Mean 0.00222288	SD 0.00102013	Variance 1.04068E-006

Proposed Eales Farm Landfill Extension Model - Chromium

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00426196	10% of values less than 0.00668052	25% of values less than 0.0148332
50% of values less than 0.0272783	75% of values less than 0.0390099	90% of values less than 0.0453094
Minimum 0.00151628an 0.0476199	Maximum 0.0498579	
Mean 0.0268441	SD 0.0139688	Variance 0.000195129

Proposed Eales Farm Landfill Extension Model - Copper

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.0162003	10% of values less than 0.0269909	25% of values less than 0.0529426
50% of values less than 0.0994152	75% of values less than 0.150123	90% of values less than 0.180345
Minimum 0.00717081an 0.189351	Maximum 0.19977	
Mean 0.101749	SD 0.0558183	Variance 0.00311568

Proposed Eales Farm Landfill Extension Model - Lead

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00741157	10% of values less than 0.00965285	25% of values less than 0.0163987
50% of values less than 0.0268909	75% of values less than 0.0389172	90% of values less than 0.0453156
Minimum 0.00501785	an 0.0479537	Maximum 0.0499217
Mean 0.0274335	SD 0.0130477	Variance 0.000170241

Proposed Eales Farm Landfill Extension Model - Manganese

Concentration at Source [mg/l] - 1000 years

05% of values less than 2.2753	10% of values less than 2.82522	25% of values less than 4.24761
50% of values less than 7.4431	75% of values less than 15.1789	90% of values less than 30.5161
Minimum 0.654579 than 48.6786	Maximum 294.527	
Mean 14.3317	SD 21.798	Variance 475.155

Proposed Eales Farm Landfill Extension Model - Mercury

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.001	10% of values less than 0.001	25% of values less than 0.001
50% of values less than 0.001	75% of values less than 0.001	90% of values less than 0.001
Minimum 0.001ess than 0.001	Maximum 0.001	
Mean 0.001	SD 1.1915E-010	Variance 1.41967E-020

Proposed Eales Farm Landfill Extension Model - Naphthalene

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00177378	10% of values less than 0.00338802	25% of values less than 0.0104125
50% of values less than 0.0208125	75% of values less than 0.0302122	90% of values less than 0.0356808
Minimum 4.16817E-005 0.0381232	Maximum 0.0479457	
Mean 0.0203233	SD 0.0117308	Variance 0.000137612

Proposed Eales Farm Landfill Extension Model - Nickel

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00406195	10% of values less than 0.00631642	25% of values less than 0.012522
50% of values less than 0.0218263	75% of values less than 0.0307502	90% of values less than 0.0361672
Minimum 0.00205451an 0.0379473	Maximum 0.0398724	
Mean 0.0215107	SD 0.0107952	Variance 0.000116537

Proposed Eales Farm Landfill Extension Model - Zinc

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.0262867	10% of values less than 0.0441818	25% of values less than 0.101235
50% of values less than 0.201349	75% of values less than 0.308356	90% of values less than 0.363834
Minimum 0.00446602	an 0.38259	Maximum 0.399988
Mean 0.202718	SD 0.115784	Variance 0.0134058

Proposed Eales Farm Landfill Extension Model - Chloride

Concentration at Source [mg/l] - 1000 years

05% of values less than 4.77548	10% of values less than 9.24366	25% of values less than 21.6777
50% of values less than 41.0098	75% of values less than 62.6551	90% of values less than 72.2895
Minimum 0.319459 than 76.7018	Maximum 79.9611	
Mean 41.4497	SD 23.1375	Variance 535.343

Proposed Eales Farm Landfill Extension Model - Fluoride

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.32916	10% of values less than 0.36693	25% of values less than 0.496432
50% of values less than 0.647511	75% of values less than 0.807413	90% of values less than 0.923521
Minimum 0.300214 than 0.961013	Maximum 0.99985	
Mean 0.649696	SD 0.196452	Variance 0.0385934

Proposed Eales Farm Landfill Extension Model - Phenol

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.0137465	10% of values less than 0.0185943	25% of values less than 0.0310285
50% of values less than 0.0555342	75% of values less than 0.0777245	90% of values less than 0.0914084
Minimum 0.0100412	an 0.0960009	Maximum 0.0998434
Mean 0.0550541	SD 0.026325	Variance 0.000693007

Proposed Eales Farm Landfill Extension Model - Selenium

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00341551	10% of values less than 0.00373659	25% of values less than 0.00491327
50% of values less than 0.00658876	75% of values less than 0.00833454	90% of values less than 0.00933369
Minimum 0.00300363an 0.00966311	Maximum 0.00999786	
Mean 0.00655424	SD 0.00201807	Variance 4.07259E-006

Proposed Eales Farm Landfill Extension Model - Sulphate (as S042-)

Concentration at Source [mg/l] - 1000 years

05% of values less than 6.22398	10% of values less than 10.2626	25% of values less than 24.4921
50% of values less than 51.038	75% of values less than 75.516	90% of values less than 89.9489
Minimum 0.512146 than 94.2153	Maximum 99.9696	
Mean 50.5731	SD 28.7777	Variance 828.156

Proposed Eales Farm Landfill Extension Model - TPH Aliphatic C5-C6

Concentration at Source [mg/l] - 1000 years

05% of values less than 6.77363	10% of values less than 11.4282	25% of values less than 29.6664
50% of values less than 34.3546	75% of values less than 37.2214	90% of values less than 39.9679
Minimum 0.213047 than 41.2193	Maximum 45.0492	
Mean 30.846	SD 10.3096	Variance 106.288

Proposed Eales Farm Landfill Extension Model - Barium

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.114043	10% of values less than 0.193637	25% of values less than 0.502509
50% of values less than 1.0097	75% of values less than 1.49251	90% of values less than 1.77852
Minimum 0.00555971an 1.89792	Maximum 1.9933	
Mean 1.00019	SD 0.57195	Variance 0.327127

Proposed Eales Farm Landfill Extension Model - Antimony

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00217725	10% of values less than 0.0024109	25% of values less than 0.00292703
50% of values less than 0.00393939	75% of values less than 0.00500363	90% of values less than 0.00563292
Minimum 0.00200354	an 0.00581567	Maximum 0.00599316
Mean 0.00398248	SD 0.00117	Variance 1.3689E-006

Proposed Eales Farm Landfill Extension Model - Molybdenum

Concentration at Source [mg/l] - 1000 years

05% of values less than 0.00455037	10% of values less than 0.00689419	25% of values less than 0.013725
50% of values less than 0.0249856	75% of values less than 0.0380699	90% of values less than 0.0456698
Minimum 0.0020835ıan 0.0476357	Maximum 0.0499678	
Mean 0.0258514	SD 0.0138531	Variance 0.000191909

Proposed Eales Farm Landfill Extension Model - Ammonium (NH4+)

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 37.9116	10% of values less than 42.1433	25% of values less than 55.5285
50% of values less than 77.5854	75% of values less than 100.488	90% of values less than 114.96
Minimum 28.6189s than 121.339	Maximum 138.936	
Mean 78.4515	SD 26.8053	Variance 718.523

Proposed Eales Farm Landfill Extension Model - Arsenic

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 3621.39	10% of values less than 4313.69	25% of values less than 5919.18
50% of values less than 7642.71	75% of values less than 9681.09	90% of values less than 11559.3
Minimum 1757.84s than 12986.2	Maximum 16394.1	
Mean 7844.23	SD 2753.08	Variance 7.57942E+006

Proposed Eales Farm Landfill Extension Model - Benzo 3, 4 pyrene

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Proposed Eales Farm Landfill Extension Model - Cadmium

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2619.74	10% of values less than 3231.86	25% of values less than 5567.58
50% of values less than 9830.53	75% of values less than 18216.3	90% of values less than 32514.5
Minimum 487.979s than 46571	Maximum 197001	
Mean 15104.3	SD 16179.5	Variance 2.61777E+008

Proposed Eales Farm Landfill Extension Model - Chromium

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 1831.23	10% of values less than 1860.54	25% of values less than 1948.98
50% of values less than 2106.77	75% of values less than 2263.62	90% of values less than 2338.5
Minimum 1800.84s than 2371.56	Maximum 2398.55	
Mean 2105.28	SD 175.402	Variance 30765.9

Proposed Eales Farm Landfill Extension Model - Copper

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 4241.08	10% of values less than 5146	25% of values less than 6874.52
50% of values less than 8732.58	75% of values less than 11136.7	90% of values less than 13767.6
Minimum 2324.08s than 14960.9	Maximum 18619.6	
Mean 9151.88	SD 3194.89	Variance 1.02073E+007

Proposed Eales Farm Landfill Extension Model - Lead

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 20788.1	10% of values less than 21981.5	25% of values less than 23900.2
50% of values less than 26090.7	75% of values less than 28460.9	90% of values less than 30651
Minimum 17578.2s than 31793.4	Maximum 37599.6	
Mean 26201.2	SD 3340.91	Variance 1.11617E+007

Proposed Eales Farm Landfill Extension Model - Manganese

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2771.89	10% of values less than 3926.04	25% of values less than 7578.32
50% of values less than 15070.4	75% of values less than 25051.7	90% of values less than 33395.7
Minimum 359.032s than 37795.2	Maximum 49814.3	
Mean 17106	SD 11257.3	Variance 1.26726E+008

Proposed Eales Farm Landfill Extension Model - Mercury

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 6426.76	10% of values less than 8535.7	25% of values less than 13372.4
50% of values less than 21934.4	75% of values less than 34964.7	90% of values less than 55308.9
Minimum 995.366s than 73528.5	Maximum 153304	
Mean 28018.6	SD 21797.6	Variance 4.75133E+008

Proposed Eales Farm Landfill Extension Model - Naphthalene

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 3.66637	10% of values less than 3.82233	25% of values less than 4.05464
50% of values less than 4.3899	75% of values less than 4.7413	90% of values less than 5.03724
Minimum 3.0262ss than 5.23556	Maximum 6.03984	
Mean 4.40866	SD 0.476684	Variance 0.227227

Proposed Eales Farm Landfill Extension Model - Nickel

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 4.41642	10% of values less than 6.68856	25% of values less than 25.883
50% of values less than 141.87	75% of values less than 816.013	90% of values less than 3920.34
Minimum 2.27896s than 9853.92	Maximum 960288	
Mean 4264.47	SD 43622.3	Variance 1.90291E+009

Proposed Eales Farm Landfill Extension Model - Zinc

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 1480.41	10% of values less than 2185.16	25% of values less than 4079.67
50% of values less than 7725.05	75% of values less than 12704.1	90% of values less than 16951.3
Minimum 404.745s than 19500.5	Maximum 26908.5	
Mean 8777.08	SD 5688.03	Variance 3.23537E+007

Proposed Eales Farm Landfill Extension Model - Chloride

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Proposed Eales Farm Landfill Extension Model - Fluoride

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 41.4247	10% of values less than 43.6119	25% of values less than 46.535
50% of values less than 50.7279	75% of values less than 54.8135	90% of values less than 59.2096
Minimum 34.3549s than 61.0308	Maximum 75.9252	
Mean 51.0156	SD 6.02737	Variance 36.3292

Proposed Eales Farm Landfill Extension Model - Phenol

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 22.4146	10% of values less than 28.0109	25% of values less than 44.7117
50% of values less than 72.3402	75% of values less than 104.425	90% of values less than 121.26
Minimum 14.9888s than 131.448	Maximum 151.596	
Mean 74.5422	SD 34.6454	Variance 1200.31

Proposed Eales Farm Landfill Extension Model - Selenium

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 458.421	10% of values less than 479.772	25% of values less than 521.104
50% of values less than 571.381	75% of values less than 626.759	90% of values less than 679.331
Minimum 341.607s than 705.464	Maximum 815.971	
Mean 575.383	SD 75.5368	Variance 5705.81

Proposed Eales Farm Landfill Extension Model - Sulphate (as S042-)

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Proposed Eales Farm Landfill Extension Model - TPH Aliphatic C5-C6

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 3.22314	10% of values less than 3.34131	25% of values less than 3.5514
50% of values less than 3.80888	75% of values less than 4.0595	90% of values less than 4.27903
Minimum 2.85296s than 4.39783	Maximum 4.94079	
Mean 3.81063	SD 0.365453	Variance 0.133556

Proposed Eales Farm Landfill Extension Model - Barium

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 5.08823	10% of values less than 6.94382	25% of values less than 12.9494
50% of values less than 32.0196	75% of values less than 78.5047	90% of values less than 173.746
Minimum 3.0526ss than 309.167	Maximum 1886.44	
Mean 80.1683	SD 159.795	Variance 25534.5

Proposed Eales Farm Landfill Extension Model - Antimony

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2175.16	10% of values less than 2268.48	25% of values less than 2451.03
50% of values less than 2681.49	75% of values less than 2910.76	90% of values less than 3158.04
Minimum 1784.43s than 3300.3	Maximum 3871.89	
Mean 2697.94	SD 341.523	Variance 116638

Proposed Eales Farm Landfill Extension Model - Molybdenum

Unretarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 2.38192	10% of values less than 2.48497	25% of values less than 2.65085
50% of values less than 2.86609	75% of values less than 3.0604	90% of values less than 3.22494
Minimum 1.99035s than 3.32031	Maximum 3.82866	
Mean 2.85772	SD 0.285469	Variance 0.0814927

Retarded Travel Time to Base of Unsaturated Zone Unsaturated Pathway 1 [years]

05% of values less than 5253.12	10% of values less than 5582.18	25% of values less than 6045.25
50% of values less than 6630.58	75% of values less than 7215.49	90% of values less than 7754.13
Minimum 3926.89s than 8063.11	Maximum 9000.09	
Mean 6631.53	SD 843.817	Variance 712028

Proposed Eales Farm Landfill Extension Model - Ammonium (NH4+)

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0.314089	10% of values less than 0.641507	25% of values less than 1.69818
50% of values less than 3.39379	75% of values less than 4.97719	90% of values less than 5.93511
Minimum 0.0297095	Mean 6.31482	Maximum 6.59598
Mean 3.34665	SD 1.90786	Variance 3.63994

Proposed Eales Farm Landfill Extension Model - Arsenic

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Benzo 3, 4 pyrene

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0.00145256	10% of values less than 0.00152163	25% of values less than 0.00168704
50% of values less than 0.00186255	75% of values less than 0.00203005	90% of values less than 0.0022172
Minimum 0.00112352an 0.00232535	Maximum 0.00301654	
Mean 0.00186794	SD 0.00026197	Variance 6.86283E-008

Proposed Eales Farm Landfill Extension Model - Cadmium

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.00270336	
Mean 8.92164E-006	SD 0.000142312	Variance 2.02526E-008

Proposed Eales Farm Landfill Extension Model - Chromium

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Copper

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Lead

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Manganese

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 7.79343	
Mean 0.0148269	SD 0.296062	Variance 0.0876525

Proposed Eales Farm Landfill Extension Model - Mercury

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.000494005	
Mean 4.93512E-007	SD 1.5614E-005	Variance 2.43797E-010

Proposed Eales Farm Landfill Extension Model - Naphthalene

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0.000331015	10% of values less than 0.000673034	25% of values less than 0.00220359
50% of values less than 0.00527882	75% of values less than 0.00896038	90% of values less than 0.012478
Minimum 6.05551E-006 0.0145693	Maximum 0.0206869	
Mean 0.00597531	SD 0.00452087	Variance 2.04383E-005

Proposed Eales Farm Landfill Extension Model - Nickel

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0.00370244
50% of values less than 0.0161739	75% of values less than 0.0272409	90% of values less than 0.0346904
Minimum 0ues less than 0.0370172	Maximum 0.0398388	
Mean 0.0162842	SD 0.0127804	Variance 0.000163337

Proposed Eales Farm Landfill Extension Model - Zinc

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.305336	
Mean 0.00262234	SD 0.0205514	Variance 0.000422359

Proposed Eales Farm Landfill Extension Model - Chloride

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 4.77548	10% of values less than 9.24366	25% of values less than 21.6777
50% of values less than 41.0098	75% of values less than 62.6551	90% of values less than 72.2895
Minimum 0.319459 than 76.7018	Maximum 79.9611	
Mean 41.4497	SD 23.1375	Variance 535.343

Proposed Eales Farm Landfill Extension Model - Fluoride

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0.32916	10% of values less than 0.36693	25% of values less than 0.496432
50% of values less than 0.647511	75% of values less than 0.807413	90% of values less than 0.923521
Minimum 0.300214 than 0.961013	Maximum 0.99985	
Mean 0.649696	SD 0.196452	Variance 0.0385934

Proposed Eales Farm Landfill Extension Model - Phenol

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 5.62525E-028	10% of values less than 1.20811E-024	25% of values less than 3.4098E-019
50% of values less than 6.90774E-015	75% of values less than 1.94951E-011	90% of values less than 4.56132E-009
Minimum 0ues less than 7.76021E-008	Maximum 6.16923E-006	
Mean 3.65239E-008	SD 2.92606E-007	Variance 8.5618E-014

Proposed Eales Farm Landfill Extension Model - Selenium

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0.00302396	10% of values less than 0.00332427	25% of values less than 0.00431489
50% of values less than 0.0057219	75% of values less than 0.00727132	90% of values less than 0.00832814
Minimum 0.00224672an 0.00878206	Maximum 0.00953655	
Mean 0.00581178	SD 0.00182635	Variance 3.33554E-006

Proposed Eales Farm Landfill Extension Model - Sulphate (as S042-)

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 6.22398	10% of values less than 10.2626	25% of values less than 24.4921
50% of values less than 51.038	75% of values less than 75.516	90% of values less than 89.9489
Minimum 0.512146 than 94.2153	Maximum 99.9696	
Mean 50.5731	SD 28.7777	Variance 828.156

Proposed Eales Farm Landfill Extension Model - TPH Aliphatic C5-C6

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 6.64478	10% of values less than 11.1869	25% of values less than 29.0732
50% of values less than 33.6804	75% of values less than 36.4971	90% of values less than 39.2629
Minimum 0.20882s than 40.5094	Maximum 44.2534	
Mean 30.2799	SD 10.1208	Variance 102.43

Proposed Eales Farm Landfill Extension Model - Barium

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0.102097	10% of values less than 0.179193	25% of values less than 0.495927
50% of values less than 1.00109	75% of values less than 1.48129	90% of values less than 1.77286
Minimum 0ues less than 1.89773	Maximum 1.9933	
Mean 0.991791	SD 0.574901	Variance 0.330511

Proposed Eales Farm Landfill Extension Model - Antimony

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Molybdenum

Concentration at Base of Unsaturated Zone Unsaturated Pathway 1 [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Ammonium (NH4+)

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0.0033683	10% of values less than 0.00644279	25% of values less than 0.0159675
50% of values less than 0.0323917	75% of values less than 0.0489471	90% of values less than 0.0733299
Minimum 0.000380408ก 0.103187	Maximum 0.462234	
Mean 0.0396192	SD 0.0406432	Variance 0.00165187

Proposed Eales Farm Landfill Extension Model - Arsenic

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Benzo 3, 4 pyrene

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 1.02524E-005	10% of values less than 1.11511E-005	25% of values less than 1.35748E-005
50% of values less than 1.73098E-005	75% of values less than 2.45031E-005	90% of values less than 3.76922E-005
Minimum 7.53302E-006 5.28885E-005	Maximum 0.000308471	
Mean 2.29728E-005	SD 2.04882E-005	Variance 4.19768E-010

Proposed Eales Farm Landfill Extension Model - Cadmium

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 3.96998E-005	
Mean 9.2259E-008	SD 1.62528E-006	Variance 2.64153E-012

Proposed Eales Farm Landfill Extension Model - Chromium

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Copper

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Lead

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Manganese

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.238552	
Mean 0.000335593	SD 0.0078891	Variance 6.22379E-005

Proposed Eales Farm Landfill Extension Model - Mercury

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 5.7162E-006	
Mean 5.71049E-009	SD 1.80672E-007	Variance 3.26424E-014

Proposed Eales Farm Landfill Extension Model - Naphthalene

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 3.25085E-006	10% of values less than 6.40194E-006	25% of values less than 2.02039E-005
50% of values less than 5.09715E-005	75% of values less than 9.18621E-005	90% of values less than 0.000163442
Minimum 1.05153E-007 0.000226753	Maximum 0.000869411	
Mean 7.19541E-005	SD 7.94052E-005	Variance 6.30518E-009

Proposed Eales Farm Landfill Extension Model - Nickel

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 3.31245E-005
50% of values less than 0.000146201	75% of values less than 0.000263252	90% of values less than 0.000438028
Minimum 0ues less than 0.000575335	Maximum 0.00416187	
Mean 0.000202816	SD 0.000291826	Variance 8.51624E-008

Proposed Eales Farm Landfill Extension Model - Zinc

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0.00941331	
Mean 3.25858E-005	SD 0.000356374	Variance 1.27002E-007

Proposed Eales Farm Landfill Extension Model - Chloride

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0.0433029	10% of values less than 0.0831063	25% of values less than 0.202107
50% of values less than 0.387936	75% of values less than 0.616182	90% of values less than 1.02937
Minimum 0.00272091	an 1.37832	Maximum 7.57947
Mean 0.513862	SD 0.556301	Variance 0.309471

Proposed Eales Farm Landfill Extension Model - Fluoride

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0.00276511	10% of values less than 0.00325621	25% of values less than 0.00439312
50% of values less than 0.00599359	75% of values less than 0.00859345	90% of values less than 0.0134805
Minimum 0.00178571an 0.0191663	Maximum 0.110088	
Mean 0.00792514	SD 0.00752856	Variance 5.66793E-005

Proposed Eales Farm Landfill Extension Model - Phenol

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 5.80292E-030	10% of values less than 1.41611E-026	25% of values less than 3.00443E-021
50% of values less than 7.03671E-017	75% of values less than 2.00251E-013	90% of values less than 4.98741E-011
Minimum 0ues less than 9.10913E-010	Maximum 4.24517E-008	
Mean 4.07538E-010	SD 2.8817E-009	Variance 8.30422E-018

Proposed Eales Farm Landfill Extension Model - Selenium

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 2.38777E-005	10% of values less than 2.78178E-005	25% of values less than 3.81829E-005
50% of values less than 5.31545E-005	75% of values less than 7.98099E-005	90% of values less than 0.000125037
Minimum 1.54415E-005 0.000170156	Maximum 0.000948811	
Mean 7.11285E-005	SD 6.70411E-005	Variance 4.49451E-009

Proposed Eales Farm Landfill Extension Model - Sulphate (as S042-)

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0.0545384	10% of values less than 0.0945796	25% of values less than 0.245894
50% of values less than 0.491465	75% of values less than 0.741276	90% of values less than 1.14577
Minimum 0.00467966	an 1.59039	Maximum 6.50343
Mean 0.599152	SD 0.57421	Variance 0.329717

Proposed Eales Farm Landfill Extension Model - TPH Aliphatic C5-C6

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0.0611883	10% of values less than 0.111592	25% of values less than 0.217131
50% of values less than 0.297747	75% of values less than 0.401268	90% of values less than 0.635637
Minimum 0.00406657an 0.88744	Maximum 4.34545	
Mean 0.369066	SD 0.345078	Variance 0.119079

Proposed Eales Farm Landfill Extension Model - Barium

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0.00108247	10% of values less than 0.00194517	25% of values less than 0.00468307
50% of values less than 0.00916513	75% of values less than 0.0145899	90% of values less than 0.0234503
Minimum 0ues less than 0.0320686	Maximum 0.188607	
Mean 0.0121761	SD 0.0143518	Variance 0.000205973

Proposed Eales Farm Landfill Extension Model - Antimony

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Proposed Eales Farm Landfill Extension Model - Molybdenum

Diluted Concentration [mg/l] Unsaturated Pathway 1 - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Ammonium (NH4+)

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 54.2464	10% of values less than 60.6021	25% of values less than 77.7165
50% of values less than 101.491	75% of values less than 126.549	90% of values less than 147.295
Minimum 32.3335s than 162.294	Maximum 353.011	
Mean 104.486	SD 36.9286	Variance 1363.72

Arsenic

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 5277.21	10% of values less than 6024.12	25% of values less than 7897.88
50% of values less than 10020.3	75% of values less than 12347.2	90% of values less than 14730.7
Minimum 2700.98s than 16657	Maximum 38169.5	
Mean 10415.1	SD 3892.55	Variance 1.51519E+007

Benzo 3, 4 pyrene

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Cadmium

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 4413.38	10% of values less than 5747.81	25% of values less than 8836.69
50% of values less than 14512.6	75% of values less than 23458	90% of values less than 41372.5
Minimum 1264.39s than 54958.8	Maximum 201775	
Mean 19658.1	SD 17600.3	Variance 3.09769E+008

Chloride

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Chromium

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 2114.21	10% of values less than 2202.21	25% of values less than 2412.44
50% of values less than 2660.33	75% of values less than 2963.7	90% of values less than 3349.16
Minimum 1887.02s than 3792.8	Maximum 7729.64	
Mean 2775.96	SD 627.325	Variance 393537

Copper

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 6276.7	10% of values less than 7266.55	25% of values less than 9095.81
50% of values less than 11562	75% of values less than 14560.2	90% of values less than 17381.2
Minimum 3934.59s than 19181.7	Maximum 42654.4	
Mean 12114.4	SD 4295.43	Variance 1.84507E+007

Fluoride

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 50.7768	10% of values less than 53.7055	25% of values less than 58.6284
50% of values less than 65.9891	75% of values less than 74.2984	90% of values less than 84.409
Minimum 39.0947s than 95.7224	Maximum 201.223	
Mean 68.8656	SD 16.8663	Variance 284.472

Lead

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 25190.3	10% of values less than 26799.9	25% of values less than 29549
50% of values less than 33291.2	75% of values less than 37493	90% of values less than 43128.2
Minimum 20187.1s than 47467.5	Maximum 97870.6	
Mean 34505.2	SD 8128.27	Variance 6.60688E+007

Manganese

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 5242.72	10% of values less than 7138.44	25% of values less than 12189.7
50% of values less than 19982.5	75% of values less than 31547.5	90% of values less than 40657
Minimum 1047.79s than 45598.9	Maximum 124624	
Mean 22582.5	SD 13380	Variance 1.79024E+008

Mercury

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 10148.8	10% of values less than 12906.3	25% of values less than 19295
50% of values less than 29568	75% of values less than 46095.3	90% of values less than 66872.3
Minimum 4135.87s than 85026.2	Maximum 172944	
Mean 36374.2	SD 24997.6	Variance 6.2488E+008

Naphthalene

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 5.07195	10% of values less than 5.34207	25% of values less than 6.04372
50% of values less than 7.11932	75% of values less than 8.29668	90% of values less than 9.68073
Minimum 3.72597s than 10.8632	Maximum 25.8294	
Mean 7.47701	SD 2.25301	Variance 5.07606

Nickel

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 19.8981	10% of values less than 33.1216	25% of values less than 101.247
50% of values less than 389.808	75% of values less than 1798.14	90% of values less than 6166
Minimum 3.23732s than 15401.5	Maximum 960355	
Mean 5565.68	SD 45125.9	Variance 2.03635E+009

Phenol

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 25.3438	10% of values less than 30.3148	25% of values less than 47.074
50% of values less than 74.8019	75% of values less than 106.844	90% of values less than 123.995
Minimum 15.5741s than 133.479	Maximum 155.278	
Mean 77.117	SD 34.6789	Variance 1202.62

Selenium

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 556.292	10% of values less than 590.227	25% of values less than 648.485
50% of values less than 730.066	75% of values less than 817.048	90% of values less than 941.901
Minimum 459.184s than 1042.52	Maximum 2299.74	
Mean 757.646	SD 177.767	Variance 31601

Sulphate (as S042-)

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Zinc

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3009.24	10% of values less than 3912	25% of values less than 6342.18
50% of values less than 10718.6	75% of values less than 15924.2	90% of values less than 20548
Minimum 889.434s than 23343.1	Maximum 44010.3	
Mean 11700.1	SD 6693.95	Variance 4.4809E+007

TPH Aliphatic C5-C6

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 4.50493	10% of values less than 4.73808	25% of values less than 5.37098
50% of values less than 6.35622	75% of values less than 7.49197	90% of values less than 8.67611
Minimum 3.23865s than 9.68791	Maximum 23.5966	
Mean 6.68835	SD 2.05386	Variance 4.21835

Barium

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 10.9809	10% of values less than 15.5919	25% of values less than 27.1444
50% of values less than 51.9196	75% of values less than 107.264	90% of values less than 233.229
Minimum 4.69714s than 401.171	Maximum 2982.11	
Mean 108.701	SD 196.444	Variance 38590.2

Antimony

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 2605.72	10% of values less than 2782.61	25% of values less than 3013.75
50% of values less than 3420.03	75% of values less than 3870.14	90% of values less than 4388.87
Minimum 2256.74s than 4869.15	Maximum 10426.7	
Mean 3563.83	SD 870.73	Variance 758170

Molybdenum

Unretarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 3.5437	10% of values less than 3.7175	25% of values less than 4.28698
50% of values less than 5.18044	75% of values less than 6.10843	90% of values less than 7.20528
Minimum 2.67143s than 7.98685	Maximum 19.9016	
Mean 5.43208	SD 1.77809	Variance 3.16162

Retarded Travel Time to Proposed Eales Farm Landfill Extension Model Receptor [years]

05% of values less than 6333.27	10% of values less than 6701.52	25% of values less than 7513.16
50% of values less than 8428.07	75% of values less than 9476.39	90% of values less than 10850.5
Minimum 4254.53s than 11923.2	Maximum 25078.5	
Mean 8750.56	SD 2192.44	Variance 4.80678E+006

Ammonium (NH4+)

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.158942	10% of values less than 0.251234	25% of values less than 0.434662
50% of values less than 0.698475	75% of values less than 1.00381	90% of values less than 1.32497
Minimum 0.00347078an 1.51876	Maximum 2.34908	
Mean 0.744961	SD 0.410763	Variance 0.168726

Arsenic

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.00719238	10% of values less than 0.0149557	25% of values less than 0.0348738
50% of values less than 0.0679534	75% of values less than 0.112498	90% of values less than 0.164021
Minimum 0.000543598ก 0.192778	Maximum 0.312795	
Mean 0.07996	SD 0.0575998	Variance 0.00331774

Benzo 3, 4 pyrene

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 5.68938E-005	10% of values less than 8.17012E-005	25% of values less than 0.000135816
50% of values less than 0.000213678	75% of values less than 0.000294993	90% of values less than 0.000362899
Minimum 8.39411E-006 0.000412982	Maximum 0.000567446	
Mean 0.000220444	SD 0.000109833	Variance 1.20634E-008

Cadmium

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 1.44294E-005	10% of values less than 3.27922E-005	25% of values less than 7.89726E-005
50% of values less than 0.000158459	75% of values less than 0.000265514	90% of values less than 0.000382004
Minimum 5.15469E-007 0.000446747	Maximum 0.000691749	
Mean 0.000185346	SD 0.000136159	Variance 1.85393E-008

Chloride

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 1.43313E-009	10% of values less than 0.00157651	25% of values less than 0.0943941
50% of values less than 0.311491	75% of values less than 0.561606	90% of values less than 0.933313
Minimum 0ues less than 1.26335	Maximum 4.78969	
Mean 0.428793	SD 0.511675	Variance 0.261812

Chromium

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.0161843	10% of values less than 0.0290073	25% of values less than 0.0640297
50% of values less than 0.118504	75% of values less than 0.174173	90% of values less than 0.228882
Minimum 0.000876881ก 0.257199	Maximum 0.41648	
Mean 0.124607	SD 0.076172	Variance 0.00580218

Copper

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.00177072	10% of values less than 0.00320598	25% of values less than 0.00866784
50% of values less than 0.0189422	75% of values less than 0.0313524	90% of values less than 0.0442042
Minimum 4.31575E-005 0.050914	Maximum 0.084366	
Mean 0.0216051	SD 0.0159275	Variance 0.000253686

Fluoride

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 3.25482E-011	10% of values less than 2.1894E-005	25% of values less than 0.00326207
50% of values less than 0.00533071	75% of values less than 0.00782174	90% of values less than 0.01228
Minimum 0ues less than 0.0173821	Maximum 0.110088	
Mean 0.00669946	SD 0.00753361	Variance 5.67552E-005

Lead

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 1.51506E-005	10% of values less than 3.00454E-005	25% of values less than 7.2312E-005
50% of values less than 0.000166997	75% of values less than 0.000285626	90% of values less than 0.000397806
Minimum 8.15848E-007 0.000483956	Maximum 0.000795536	
Mean 0.000196362	SD 0.000148998	Variance 2.22003E-008

Manganese

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.000568621	10% of values less than 0.00110474	25% of values less than 0.00262116
50% of values less than 0.00555139	75% of values less than 0.00950032	90% of values less than 0.0131604
Minimum 2.26855E-006 0.0152285	Maximum 0.0241746	
Mean 0.00643487	SD 0.00466404	Variance 2.17533E-005

Mercury

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 8.23212E-007	10% of values less than 1.39287E-006	25% of values less than 3.32117E-006
50% of values less than 7.16912E-006	75% of values less than 1.26575E-005	90% of values less than 1.85772E-005
Minimum 1.01856E-008 2.15813E-005	Maximum 3.95063E-005	
Mean 8.8303E-006	SD 6.71597E-006	Variance 4.51043E-011

Naphthalene

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.0267282	10% of values less than 0.0496328	25% of values less than 0.111547
50% of values less than 0.223281	75% of values less than 0.327533	90% of values less than 0.427596
Minimum 0.000297288ก 0.500178	Maximum 0.844865	
Mean 0.234243	SD 0.146562	Variance 0.0214804

Nickel

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 3.47573	10% of values less than 7.78103	25% of values less than 17.9883
50% of values less than 36.1793	75% of values less than 59.4515	90% of values less than 76.8877
Minimum 0.0809161	an 87.7752	Maximum 151.434
Mean 39.9511	SD 26.753	Variance 715.723

Phenol

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 5.3041E-025
50% of values less than 8.90796E-020	75% of values less than 1.02246E-015	90% of values less than 4.0994E-013
Minimum 0ues less than 5.7138E-012	Maximum 1.37511E-008	
Mean 3.97895E-011	SD 5.77607E-010	Variance 3.3363E-019

Selenium

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 4.79905E-018	25% of values less than 2.07633E-005
50% of values less than 3.78881E-005	75% of values less than 5.69027E-005	90% of values less than 8.1681E-005
Minimum 0ues less than 0.000103301	Maximum 0.000338143	
Mean 4.22208E-005	SD 3.68158E-005	Variance 1.3554E-009

Sulphate (as S042-)

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 2.24082E-009	10% of values less than 0.00119092	25% of values less than 0.114913
50% of values less than 0.405615	75% of values less than 0.672047	90% of values less than 1.03191
Minimum 0ues less than 1.47343	Maximum 6.50343	
Mean 0.504288	SD 0.574197	Variance 0.329703

Zinc

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0.0269695	10% of values less than 0.049462	25% of values less than 0.114267
50% of values less than 0.218914	75% of values less than 0.364733	90% of values less than 0.49955
Minimum 0.00158285	an 0.592053	Maximum 0.975563
Mean 0.254822	SD 0.181992	Variance 0.0331211

TPH Aliphatic C5-C6

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 1.22243E-009	10% of values less than 0.000822141	25% of values less than 0.133364
50% of values less than 0.255177	75% of values less than 0.367079	90% of values less than 0.57981
Minimum 0ues less than 0.771285	Maximum 4.06783	
Mean 0.303769	SD 0.328211	Variance 0.107722

Barium

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 2.09417E-012	10% of values less than 1.41359E-005	25% of values less than 0.00229367
50% of values less than 0.00752228	75% of values less than 0.0129911	90% of values less than 0.020135
Minimum 0ues less than 0.0290958	Maximum 0.188607	
Mean 0.0100866	SD 0.0132046	Variance 0.00017436

Antimony

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Molybdenum

Concentration at Proposed Eales Farm Landfill Extension Model Receptor [mg/l] - 1000 years

05% of values less than 0	10% of values less than 0	25% of values less than 0
50% of values less than 0	75% of values less than 0	90% of values less than 0
Minimum 0ues less than 0	Maximum 0	
Mean 0	SD 0	Variance 0

Aquifer Flow [m³/yr]

Proposed Eales Farm Landfill Extension Model

05% of values less than 47866.3	10% of values less than 69739	25% of values less than 111472
50% of values less than 152905	75% of values less than 190145	90% of values less than 227549
Minimum 9429.22s than 242657	Maximum 276927	
Mean 149887	SD 57389.8	Variance 3.29359E+009

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Appendix I Slope Stability Assessment

geo consulting engineering ltd

Environmental Permit Variation Application

Permit: EPR/FB3403XR

Eales Farm Landfill, Tamar View Industrial, Saltash

Slope Stability Assessment

Report: GCE00692/2020/SSAv2

March 2021

GCE00692/2020/SSAv2

Report prepared for:	Tamar Valley Projects Ltd Harscombe House 1 Darklake View Estover, Plymouth PL6 7TL
Report Number:	GCE00692/2020/SSA
Version:	2
Issue Date:	March 2021
Report Prepared by:	Rose Ashmore MSci., MSc., FGS

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Stability Analyses by: Philip Curtis BSc., MSc., CGeol., FGS

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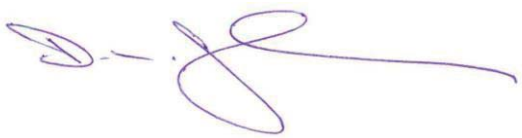
Report Reviewed by: David Jackson BSc., CEng., MICE., FGS



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FIGURES

APPENDICES

1.0 INTRODUCTION

1.1 Background

Eales Farm Landfill (EFL) was run as an inert landfill by John Garrett and Sons (Ltd) from around 1974 to 1991 and by Downderry Construction (Western) Ltd from 1991 to 2005. The site was officially put into closure in November 2016. The permit was transferred to Tamar Valley Projects Ltd (TVPL) in September 2017. TVPL wish to vary the existing permit to facilitate filling with inert waste to achieve the finished profile set out in the planning permission thus allowing the site to be restored.

A number of conversations and meetings have been held with officers from the Environment Agency in order to determine the most appropriate form of permit application to facilitate the site being re-opened, culminating with a site meeting on 7th March 2019. Following that meeting EA advised that variation of the existing permit was the most appropriate way to progress the completion of filling at the site.

This slope stability assessment has been prepared in support of the application to vary the existing environmental permit to allow the inert landfill at Eales Farm (ref: EPR/FB3403XR) to re-open. The assessment draws on the information gathered from a number of ground investigations along with quarterly monitoring data collected since May 2017.

1.2 Site Description

The site is situated in a former valley feature. Since the permit was issued in 1974 waste has been deposited within the valley. The current profile of the site comprises three main slopes separated by two platforms; these are summarised in table below.

Area	Description	Approximate Levels	Approximate Slope Angle
Top platform	Across the south-west area of site. Area predominantly filled to planning permission level so little to no filling is proposed in this area.	70m AOD	-
South Slope	Slope along the south boundary (east of the site entrance) is part of the natural valley slope with little to no fill across it. A SWW drain runs along the base of slope. No waste can be deposited within this area as per the planning permission.	Crest of slope: 80m AOD Toe of slope: 69- 43m AOD	19°
Central Slope	Slope connecting the top platform to the bottom platform. Constructed from waste material. Spans from the south-east corner to the centre point of the north boundary.	Crest of slope: 68m AOD Toe of slope: 51- 49m AOD	29°
Bottom Platform	Across the north-east of site comprising of waste material. Levels currently well below planning permission completion levels, area where most filling is proposed.	48 – 44m AOD	-
East Slope	Slope at the site boundary in the east of the site. Drops from the bottom platform down to the original valley floor level.	Crest of slope: 44m AOD Toe of slope: 20- 22m AOD	34°

The current site layout is presented in Figure 1.

1.3 Proposed Development

Filling of the landfill to the planning permission levels is proposed to be carried out in three main phases following reprofiling of the East Slope (existing lower slope) to a flatter angle. Construction of each phase will include:

- Clearing of vegetation
- Preparing the surface including minor reprofiling
- Placing of the basal liner
- Constructing side liner using the 'Christmas tree method'.
- Placing and compacting the waste in layers
- Once at finished profile level, topsoil surface and seed.

The basal and side liner will be constructed over the existing waste to create a barrier between the existing waste and the new waste. Details of the liner construction is provided within GCE00692/2020/ESSD.

Following reprofiling of the east boundary slope to a flatter angle, waste will predominantly be placed across the Bottom Platform, working from north to south and constructed in layers placed against the Central Slope. A 5m bund at the top of the East Slope will separate the new slope from the crest of the existing slope profile. The proposed slope will be constructed at an angle of 22°. The final profile of the site is illustrated on Figures 2 to 5.

2.0 GROUND INVESTIGATION FINDINGS

Since April 2016 several ground investigations have been carried out at the site. A summary of these investigations is included in GCE00692/R3. Quarterly monitoring of ground gas, groundwater, surface water quality and groundwater quality has also been carried out since May 2017. The ground model has been produced using the collated data from previous ground investigations and quarterly monitoring.

2.1 Geological units

The table below includes a summary of the main units used for the slope stability models:

Unit	Details
1. Underlying bedrock - Torpoint Formation	Comprises extremely weak to very weak cleaved extremely closely fractured purple mudstone. Fractures within the bedrock are principally along cleavage planes typically dipping between 40° to 50°. Some variation in the cleavage was seen across the site with the dip recorded at 80° in B19-5 and around 20° to 30° in B19-7. Minor distortions (apparent kink bands) were noted along some of the cleavage planes in several locations suggesting some deformation has occurred in the area. Light green siltstone beds were encountered within B19-2, B19-5 & B19-7. The siltstone beds are generally more competent ranging from very weak to weak. Quartz veins within the siltstones (and occasionally within the mudstones) contain inclusions of black minerals possibly containing manganese and/or iron.
2. Existing landfill waste	Predominantly comprises firm to stiff very gravelly slightly sandy clays tending to very clayey gravels of angular platey mudstone. Contains zones with high abundance of rubble including concrete and granite boulders. Occasional pieces of organic matter present within the waste, typically old branches or fragments of wooden pallets. The waste infills an old valley feature resulting in the thickest deposits running roughly SW-NE through the centre of site and waste deposits thinning out towards the north and south. The thickest part of the landfill (B19-5) contains 22.3m of waste.
3. Basal Liner	A basal liner will be constructed on top of the existing waste, creating a barrier between the two waste masses. The barrier is required to have a permeability <10E-9m/s therefore, it will be constructed using fine grained soils. Details of the liner construction is included within GCE00692/2020/ESSD
4. New landfill waste	The imported material will be limited to inert waste; a list of waste codes to be is included within GCE00692/2020/ESSD. The waste will be placed and compacted in layers as per the method set out in GCE00692/2020/ESSD. It has been assumed the imported waste will be similar to the waste already present on site which is dominated by gravelly clay/ clayey gravel of angular platey mudstone.

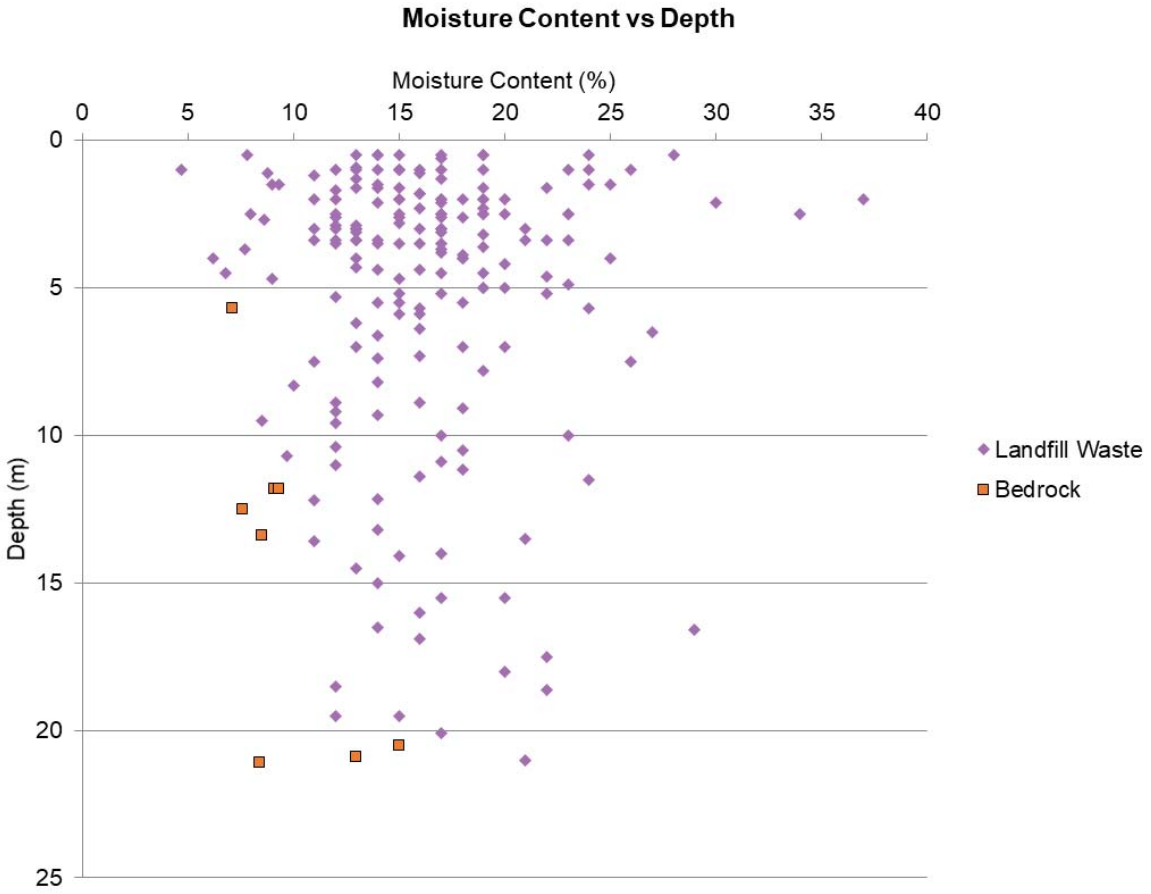
2.2 Geotechnical Testing

The table below summarises the geotechnical testing carried out from previous ground investigations (see GCE00692/R3 for full details).

Summary of Geotechnical Testing

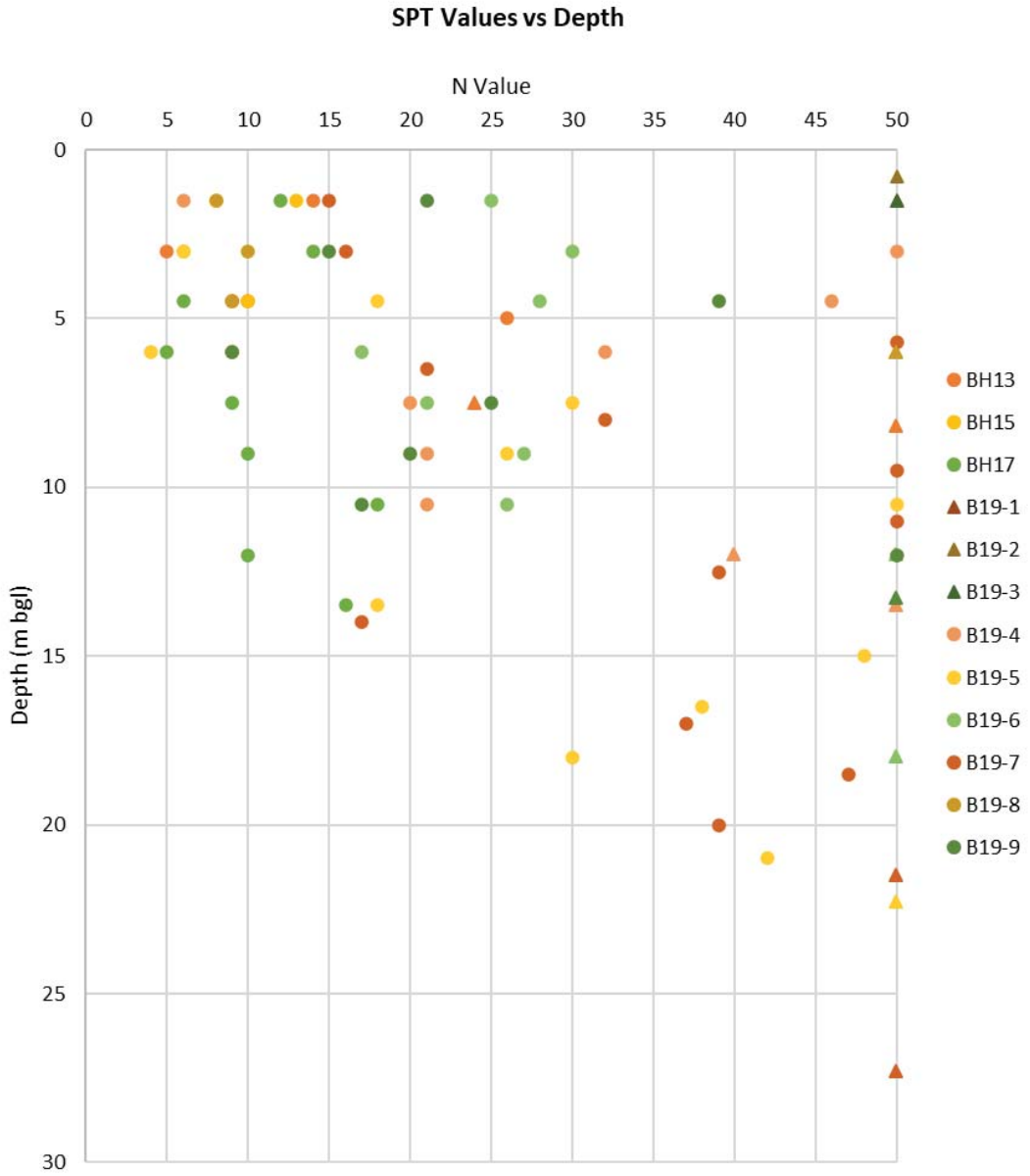
Test	No. Tests	Results	Range	Average
Plasticity Index	10	Liquid Limit	22 to 60%	41%
		Plasticity Limit	12 to 27%	17%
		Plasticity Index	10 to 38	24
		Consistency Index	-2.94 to 1.18	0
Drained shear box test	9	Angle of shearing resistance	20.8 to 40.0°	28°
		Effective cohesion	3 to 37kPa	18kPa
Particle Size Distribution	17	SHW Class	2C to 1A/B	2C
		<0.063mm	6 to 34%	19%
Slake Durability Index	7	1st Cycle	89.8 - 95.1%	92.50%
		2nd Cycle	89.1 - 94.9%	92.00%
Particle Density	5		2.63 to 2.73 Mg/m^3	2.68 Mg/m^3
Permeability Test	3	Constant Head Test	2.75E-10 to 4.78E-10 m/s	4.02E-10 m/s

The schematic below presents the moisture content data collected form the February 2020 ground investigation:



The moisture contents range from 4.7 to 37% with an average of 16%.

The Standard Penetration Testing results carried out in the boreholes drilled in August 2018 and February 2020 are presented below:



Where SPT refused (i.e. N value >50 or test failed to reach the 150mm seating and 300mm penetration) the N value is set at 50.

Triangle depict SPTs in natural bedrock, circle depict SPTs in landfill waste.

2.3 Geometry/ Topography

As aforementioned the site lies within a former valley; the valley floor runs through the rough centre of site trending SW-NE. Exploratory holes where the waste/bedrock contact was encountered confirm the thickness of waste is greatest along the valley floor, reaching up to 22.3m, thinning towards the north and south boundaries.

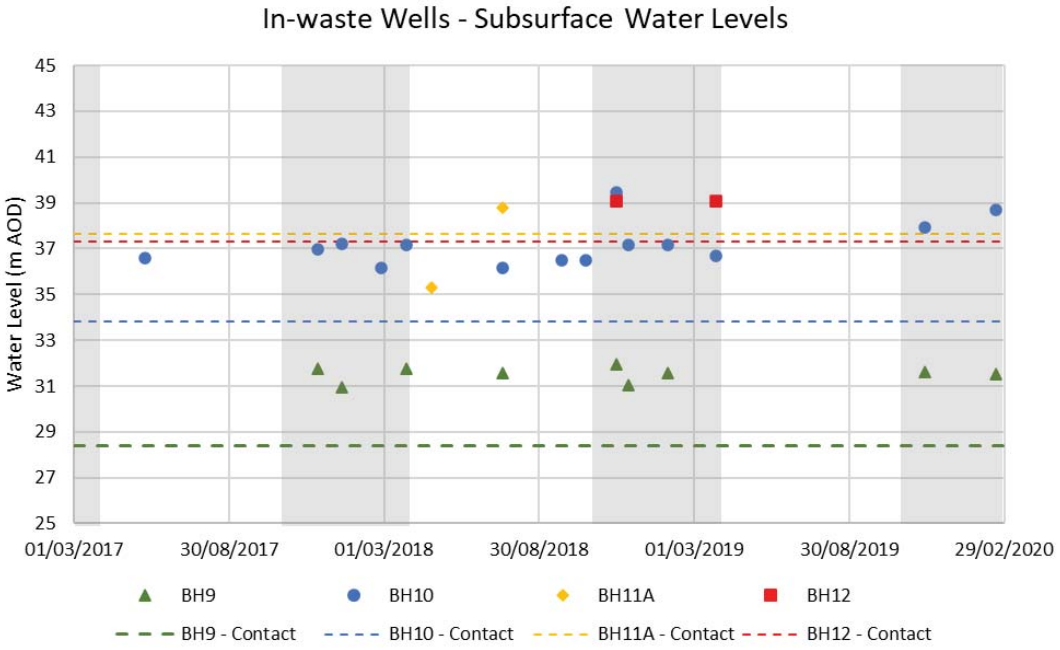
The current site profile includes two slopes constructed from waste material: the Central Slope and the East Slope. The Central Slope spans across the approximate centre of site at roughly 29°, dropping from 68m AOD to around 50m AOD. The East Slope is situated in the north-east quadrant of site with its face lying at roughly 34°. The slope drops down to the natural valley floor with the slope toe running along the site boundary. The slope is currently densely vegetated with thick brambles, buddleia, and semi-mature/mature trees. A. shallow slope failure was observed on the north side of the lower slope in the north east area of the site during the site inspection visit of March 2019.

Cross sections A-D (see figures 2-5) show that the waste/bedrock contact encountered within the exploratory holes roughly reflects the topography taken from the 1970 OS map. This suggests that the natural topography of the site was not significantly altered prior to filling. Cross Section D (Figure 5) also highlights the waste is confined by the valley sides to the north-west and south; the only direction of potential large-scale waste movement is therefore down the valley towards the north-east.

2.4 Hydrogeology

Groundwater has been monitored at the site since May 2016. Evaluation of the data shows the groundwater lies near to the waste/bedrock contact across the Top Platform falling to approximately 5m below the contact beneath the Bottom Platform. Groundwater levels within BH11B indicated some seasonal variation with levels rising by up to 5m during the wetter periods (November to March). Further details are included within GCE00692/2020/ESSD and the Hydrogeological Risk Assessment report (both submitted as part of this application).

Subsurface water has also been recorded within some of the ‘in-waste’ wells. Water within the waste is notably more common during periods of wetter weather (November to March). The graph below summarises the subsurface water in relation to the waste/bedrock contact within the ‘in-waste’ wells situated on the Bottom Platform and in proximity to the North Slope.



Shaded areas represent November to March
BH10 contact assumed as not reached during drilling

The above graph suggests some subsurface water is intermittently present within the waste with water encountered more often between November and March. However, subsurface water is more consistently encountered within BH10 with water 2-3m above the contact. Over 2018 subsurface water within BH9 was also commonly recorded at roughly 3m above the waste/bedrock contact.

In February 2020 additional groundwater monitoring wells were installed within the waste; this included multilevel piezometers across the Bottom Platform and drive-in piezometers along the toe of the North Slope. The data collected to date is summarised in the below tables:

In-waste groundwater monitoring wells installed Feb 2020

Well ID	Base of well at installation		Waste/Bedrock Contact (m AOD)	Groundwater monitoring level		
				18/03/20	01/04/20	16/04/2020
	m bgl	m AOD		m AOD	m AOD	m AOD
B19-5b	13.6	30.47	22.3	Dry	Dry	Dry
B19-5c	9.1	34.97		Dry	Dry	Dry
B19-5d	4.31	39.76		Dry	Dry	Dry
B19-7b	18.62	31.44	29.76	33.79	31.98	Dry
B19-7c	13.72	36.34		Dry	Dry	Dry
B19-7d	2.95	47.11		47.39	Dry	47.27
B19-8b	4.15	42.08	40.83	Dry	Dry	Dry
B19-9b	12.41	34.24	33.35	Dry	Dry	34.24
B19-9c	10.06	36.59		Dry	Dry	Dry
B19-9d	5.93	40.72		WAB	WAB	40.72

WAB = wet at base

Drive-in Piezometers installed Feb 2020

Well ID	Base of well at installation		Groundwater monitoring depths		
			18/03/20	01/04/20	16/04/2020
	m bgl	m AOD	m bgl	m bgl	m bgl
DP01	2.92	26.08	Dry	Dry	Dry
DP02	1.92	29.842	Dry	Dry	Dry
DP03	1.15	23.25	Dry	Dry	Dry
DP04	2.62	24.952	Dry	Dry	Dry
DP05	2.46	20.54	Dry	Dry	Dry
DP06	2.37	25.387	2.24	2.24 (25.517m AOD)	2.25 (25.507m AOD)
DP07	0.77	57.832	Dry	Dry	Dry
DP08	2.72	54.694	2.66 (54.754m AOD)	Dry	Dry
DP09	1.7	54.617	Dry	Dry	Dry
DP10	1.75	51.427	Dry	Dry	Dry

See Figure 1 for exploratory hole locations.

The above tables indicate subsurface water up to 4m above the waste/bedrock contact within B19-7. Monitoring of the drive-in piezometers shows the near-surface soils across the face of the North Slope are typically dry with the exception of DP06 where sub-surface water has been encountered 2.24m below the surface.

The hydraulic gradient across the site is approximately 0.10 (measured using data from BH2B to BH11B).

2.5 Culvert

A 900mm (internal diameter) culvert and South West Water combined sewer both run through the site. No waste has been, or will be, place over the combined sewer pipe that runs along the southern edge of the existing landfill mass; it has therefore not been considered any further.

The culvert runs through the rough centre of site along the waste/bedrock interface, thought to follow the old valley floor. The culvert receives surface water run-off from the Tamar View Industrial Estate adjacent to site and discharges in into an unnamed stream at the toe of the North Slope. The JGP Slope Stability Report states during its construction the culvert was '*surrounded in a wide zone of large permeable granular material'* (12933/R7). The material surrounding the culvert will therefore have a significantly greater permeability then that of the mass waste material within the landfill.

As part of the proposed enabling works to reopen the site a new culvert will be constructed, thus removing reliance on the older deeper culvert. The new culvert seeks to limit the extent of the buried section of watercourse and will therefore carry the surface water run-off northwards discharging into the pond on the north boundary from where the existing ditch channels will be improved to carry the flow eastwards and south-east along the northern and eastern boundaries down to the existing discharge point. Further details outlining the proposed culvert re-alignment are included within the GCE00692/2020/ESSD.

The surface water run-off from the industrial estate will cease to be carried under the Bottom Platform and no longer discharge at the toe of the North slope.

2.6 Ground Gas Pressure

As part of the permit application a Gas Risk Assessment has been carried out. The report concluded a build-up of gas pressure was unlikely / low risk and has therefore not been included within the slope stability assessment.

See Gas Risk Assessment report (ref: GCE00692/2020/GRA).

2.7 Waste Settlement

The existing landfill waste predominantly comprises firm to stiff very gravelly slightly sandy clay tending to very clayey gravel of angular platey mudstone. The ground investigation carried out in February 2020 encountered some soft zones within the top 6m of the waste and pockets of waste containing abundant rubble. See GCE00692/R3 for further details.

No information specifying the method used for the placement of the waste present on site has been provided to GCEL or TVPL however, the JGP Slope Stability Report issued in November 2016 (ref: 12933/R7) states '*the waste was placed/compacted in layers'*.

Consolidation settlement calculations modelled 15m of new waste placed over 12m of historic waste and assume the new waste to be unsaturated with a density of 19kN/m^3.

The calculations were run using coefficient of volume compressibility (m_v) of 0.1m^2/MN, 0.15m^2/MN, 0.2m^2/MN, and 0.25m^2/MN to provide a degree of sensitivity analysis. The m_v values used include the figures given for clay fill and gravel fill by Charles & Watts 2001. A summary of the results is presented in the table below:

Consolidation Settlement Calculation Results

m_v (m^2/MN)	Maximum Settlement (mm)	Likely Settlement (mm)
0.10	340	220
0.15	510	340
0.2	680	450
0.25	850	570

The above "maximum settlement" figures present a worst-case estimate assuming that the load from 15m of new waste is applied to the full 12m thickness of underlying existing waste. In reality there will be a degree of stress reduction with increasing depth and also a reduction in m_v with increasing depth owing to the consolidating effect of the upper layers of material placed on the lower material. The "Likely Settlement" figures include allowance for stress dissipation with depth and reflect the anticipated reduction in m_v values as the underlying material consolidates. It is further noted that the magnitude of settlements will be influenced by the underlying topography; the was material is placed within a former valley and as such the waste thickness reduces to north and south, and to a lesser degree to the west. This will result in the settlement figures estimated above only applying to the central east location away from which the anticipated magnitude of settlement will reduce.

The magnitude of settlement is not considered significant or likely to affect the integrity of the AEGB or slope stability.

3.0 SLOPE STABILITY ASSESSMENT METHODOLOGY

3.1 Introduction

The slope stability assessment requires consideration of the following:

1. Geometry of slope profile and layers of soil and rock.
2. Groundwater levels and pore-water pressures
3. Soil and rock characteristic values of unit weight and strength parameters.
4. Numerical modelling.
5. Effective stress conditions in saturated and unsaturated zone.

3.2 Geometry of Slope Profile and Layers of Soil and Rock:

The existing slope profile has been used to assess the stability of the slope using the selected soil parameters.

The existing slope profile slope angle will be reduced to 25 degrees, with a 5m berm at the top and a 22 degree land raise slope angle above has been used to assess the proposed slope profile.

3.3 Groundwater Levels and Pore-water Pressures:

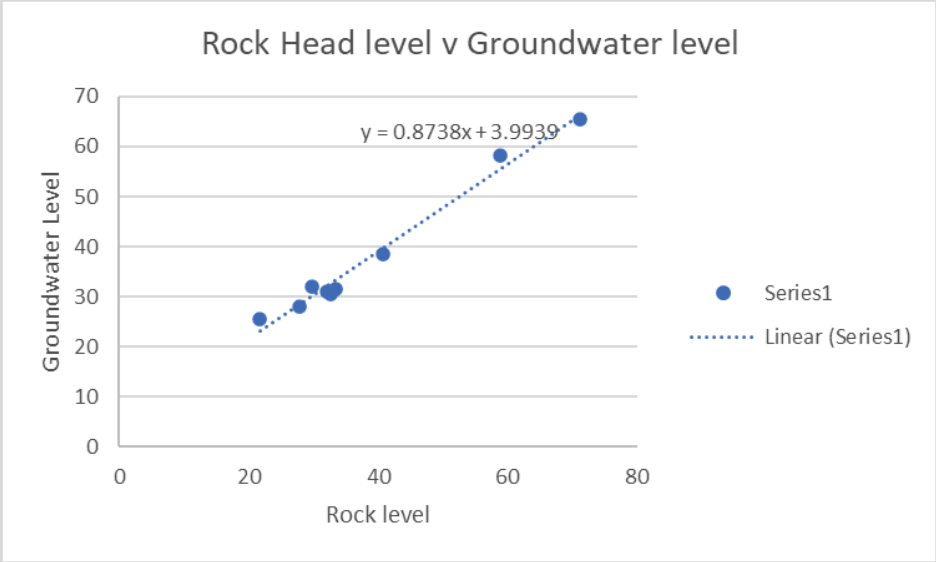
The most recent groundwater monitoring was undertaken in Boreholes 19-1 to 19-9. The groundwater levels in many of the wells was below rock level (RL), however, elevated water levels were recorded in BH19-5 and BH19-7. These are located on the selected cross section used for the slope stability assessment.

Perched groundwater levels were recorded in BH19-7 and BH19-9 within the waste mass. The perched water levels in BH19-7 are useful for calibration of the sub-surface water using SeepW analysis.

The following table provides the highest recorded water levels in the monitoring wells:

BH19	RL	GWL1	GWL2	GWL3
1	71.27	65.47		
2	32.65	30.4		
3	58.91	58.2		
4	27.93	27.92		
5	21.77	**25.48**		
6	32.19	31.06		
7	29.76	**32.09**	33.79	47.39
8	40.83	38.48		
9	33.35	31.49	34.85	40.69

The following plot shows the relationship between top of rock level and groundwater level:



The groundwater pressures are typically generated in the underlying rock mass. The exceptions to this are GWL2 and GWL3 where perched water was recorded in BH19-7 and BH19-9.

The porewater pressure distribution is critical to the stability of any slope. The water pressure exerts either a negative or positive water pressure to the soil particles. The weight of the soil mass creates a total vertical stress (σ). A positive water pressure (u) creates a buoyant up-lift against the soil particles and a negative water pressure creates a matric suction. The effective stress (σ'=σ-u) is critical to the apparent stability of a soil slope in particular, but also to a rock slope.

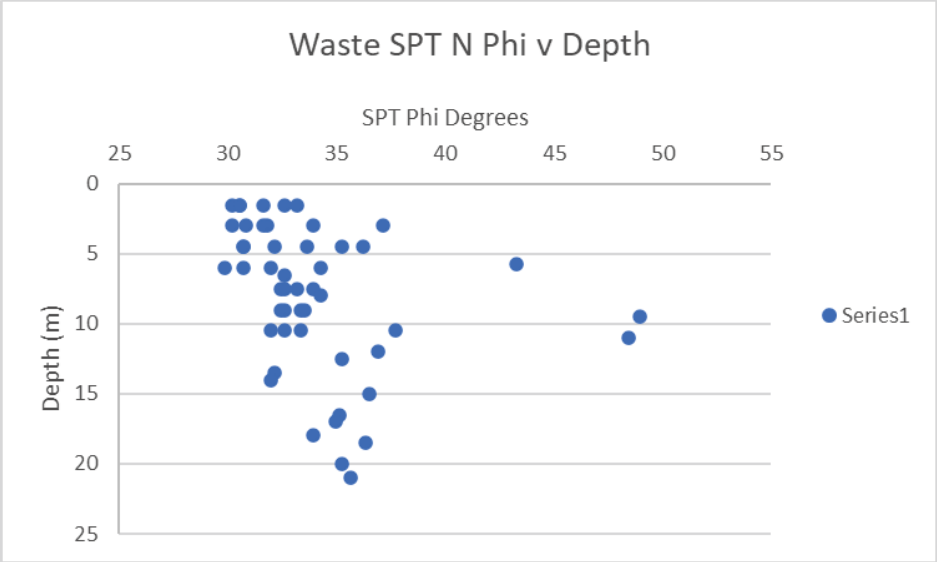
A negative porewater pressure can be maintained in embankment bunds and is subject to the actual infiltration rate of water and established drainage patterns. This can allow an embankment bund to stand at steep angles which can provide a false impression of the internal shearing resistance parameters, where matric suctions can significantly enhance the effective stress and improve the soils' resistance to failure. The increase in water pressure can therefore both cancel out the enhanced shearing resistance and significantly reduce the effective stress resulting in a brittle failure due to significant loss of shearing resistance.

3.4 Soil and Rock Profile.

The site is underlain by Torpoint Formation. A typical ground profile is likely to be as follows:

- Waste layer 1
- Waste layer 2
- Waste layer 3
- Weathered Torpoint Formation mudstone slate gravels.
- Torpoint Formation rock

The existing waste layers have been characterised by in-situ Standard Penetration Testing (SPT) and conversion of the SPT to an angle of internal shearing resistance (Phi) measured in degrees.



The above table indicates three layers, where the data indicates lowest Phi values of 30, 32 and 34 for the layers 1 to 3 respectively.

The drained shear box testing provides an average angle of shearing resistance of 28 degrees with a range of 21 to 40 degrees. Waste layer 1 has therefore been reduced from 30 degrees to 28 degrees for the purpose of the slope stability assessment.

3.5 Numerical Modelling.

A preliminary assessment of the soil internal angle of shearing resistance can be communicated using a planar translational slide failure, which is typical of shallow rain induced landslips.

The Geo-Studio software SlopeW provides a numerical basis for modelling the slope stability. This can be coupled with Geo-Studio software SeepW which provides a numerical basis for modelling groundwater pressures and seepage of groundwater.

The slope stability is expressed as a ratio of resistance forces divided by driving forces providing a factor of safety (FoS). A factor of safety of greater than 1 suggests stability and less than 1 suggests instability. The actual stability will be subject to the strain movement required to mobilise the strength and the definition of slope failure. The use of a mobilisation factor to take a peak strength parameter to a constant volume strength parameter will limit the strain required to mobilise the strength but provide a lower factor of safety.

The interpretation of the factor of safety therefore requires consideration of the selected slope geometry, groundwater pressures, unit weight and design strength parameters.

The modelling has been undertaken in three stages:

1. SlopeW1 with an estimated groundwater pressure profile based on topography coupled with experience including suction in unsaturated zone.
2. SlopeW2 based on SlopeW1 above without suction in the unsaturated zone.

3. SeepW to determine groundwater pressures equivalent to the measured groundwater levels and then with drainage effects on seepage and groundwater pressures. SlopeW based on the modelled SeepW water pressures, either existing or with drainage.

Optimisation of the stability analysis provides a non-circular failure surface which provides the worst credible but more likely failure surface in the least favourable conditions.

3.6 Effective Stress Conditions in Saturated and Unsaturated Zone.

The effective stress condition is fundamental to the assessment of soil particle assessment of strength and stability. The unsaturated zone will experience negative porewater pressures, whilst the saturated zone will experience positive porewater pressures. The numerical modelling of this most important element controlling the shear resistance and stability of the slope is necessary in order to understand the importance of infiltration and drainage of sub-surface water and groundwater pressures.

The negative porewater pressures will allow a slope to stand at much steeper angles than the saturated angle of repose. This can result in a false sense of security in the stability of a slope and the failure to appreciate the importance of water as the controlling factor of whether a slope stands or fails and the potential for brittle, rapid and potentially severe landslides versus slope creep movement over longer-terms.

The use of SeepW allows the assessment infiltration and drainage in order to communicate the significance of effective stress.

The shorter-term conditions and observations may not reflect the longer-term weathering and alteration of the mudstone-slates to gravelly clays with longer-term build up in porewater pressures.

4.0 PRELIMINARY SLOPE STABILITY OUTPUT

4.1 Introduction

Two methods of slope stability analysis have been undertaken in order to communicate the important factors in controlling the slope stability:

- Planar Translational Failure spreadsheet calculations use to assess credible soil strength parameters.
- Geo-Studio software SlopeW and SeepW.

4.2 Planar Translation Failure

A preliminary assessment of the soil internal angle of shearing resistance can be communicated using a planar translational slide failure, which is typical of shallow rain induced landslips:

The following staged approach may be used to assess the existing fill slope at 32 degrees:

- Slope with suction.
- Suction with seepage.
- Loss of suction such as a dry cohesionless soil.
- Porewater pressure ratios of 0.1 and 0.2 applied.
- Slope reduced to 18 degree (1v:3h) and porewater pressure of 0.2 applied.
- Saturated slope.
- Saturated slope at 18 degrees.

The following shear strength condition is assumed:

- Existing Internal angle of shearing resistance of 28 degrees. Cohesion =0kPa
- Proposed Internal angle of shearing resistance of 26 degrees

Existing slope angle 32 degrees with internal Angle of Shearing Resistance of 28 degrees:

Peak Slope	Favourable Suction	Seepage Suction	Dry cohesionless	Pore pressure Ratio	Pore pressure Ratio	Critical Saturated
Angle	32	32	32	32	32	32
Friction	28	28	28	28	28	28
Y	18	18	18	18	18	18
Yw	9.81	9.81	0	9.81	9.81	9.81
Ysub	8.19	8.19	18	8.19	8.19	8.19
z	1	1		1	1	
hs	0.4	0.4				
hw				0.1	0.2	
yz				9.81	9.81	
u				0.981	1.962	
ru				0.1	0.2	
sec^2B				2.28	2.28	
FoS	1.11	1.04	0.85	0.66	0.46	0.39

The above table indicates the existing slope stability is most likely maintained by matric suctions within the strata providing an apparent cohesion which enhances the shearing resistance of the material.

The above table demonstrates calculated factors of safety (FoS) based on the assumptions of porewater pressure in the slope combined with the internal angle of shearing resistance.

The porewater pressure ratio of 0.2 and the critical saturated condition indicates a FoS of less than 1 and slope failure.

This indicates the existing slope profile is oversteep.

Lower Slope angle 25 degrees and Internal Angle of Shearing Resistance 28 degrees:

Peak	Favourable	Seepage	Dry	Pore pressure	Pore pressure	Critical
Slope	Suction	Suction	cohesionless	Ratio	Ratio	Saturated
Angle	25	25	25	25	26	26
Friction	28	28	28	28	28	28
Y	18	18	18	18	18	18
Yw	9.81	9.81	0	9.81	9.81	9.81
Ysub	8.19	8.19	18	8.19	8.19	8.19
z	1	1		1	1	
hs	0.5	0.5				
hw				0.1	0.2	
yz				9.81	9.81	
u				0.981	1.962	
ru				0.1	0.2	
sec^2B				1.56	1.62	
FoS	1.52	1.45	1.14	0.96	0.74	0.50

The above table indicates the significance of water pressures in the slope. The suction generated by negative water pressures will allow the slope stand with an apparently high factor of safety.

The critical saturation condition again demonstrates the importance of slope drainage and minimising infiltration of water into the slope.

Upper slope angle 22 degrees with internal angle of shearing resistance of 26 degrees:

Peak	Favourable	Seepage	Dry	Pore pressure	Pore pressure	Critical
Slope	Suction	Suction	cohesionless	Ratio	Ratio	Saturated
Angle	22	22	22	22	22	22
Friction	26	26	26	26	26	26
Y	18	18	18	18	18	18
Yw	9.81	9.81	0	9.81	9.81	9.81
Ysub	8.19	8.19	18	8.19	8.19	8.19
z	1	1		1	1	
hs	1	1				
hw				0.1	0.2	
yz				9.81	9.81	
u				0.981	1.962	
ru				0.1	0.2	
sec^2B				1.39	1.39	
FoS	1.97	1.87	1.21	1.04	0.87	0.55

The above assessment indicates the following:

- Stability achieved assuming internal angles of shearing resistance of 28 degrees for existing slope and 26 degrees for proposed slope.
- Existing slopes unlikely to be fully saturated as confirmed by the groundwater monitoring.
- The conditions that allow observed slopes to stand at steep angles may alter for short duration conditions, such as rainstorms with high infiltration rates into tension cracks resulting in significant reduction in effective stress and loss of shearing resistance. The unfavourable condition may occur during a short duration storm event which could happen at any time, however, the likelihood of such an event increases where the intended design life of the earthworks structure extends over longer time periods. It is therefore the condition that is likely to result in slope

failure rather than the time alone, where constant volume strength parameters are used for design.

4.3 SlopeW and SeepW Analysis Input Parameters

The SlopeW modelling is based on the Morgenstern-Price method with optimised critical slip surface location and water filled tension crack line. Suction is modelled based on a residual water content at 10% of the saturated water content.

The SeepW modelling uses boundary condition of pressure head, rainfall infiltration (m/s), zero-water pressure and potential seepage face analysis. This allows determination of flux from drainage locations.

The following table presents the material types and input parameters based on engineering judgement:

Material	Unit Weight	Cohesion	Phi	Hydraulic conductivity
Units	kN/m^3	kPa	Degrees	m/s
Proposed Waste	21	0	26	1E-07
Proposed waste (2)	21	2	26	1E-07
Waste layer 1	21	0	28	1E-08
Waste layer 1 (2)	21	2	28	1E-08
Waste Layer 2	21	0	32	1E-07
Waste layers 2 (2)	21	0	32	1E-07
Waste Layer 3	21	0	34	1E-07
Waste Layer 3 (2)	21	0	34	1E-07
Weather Torpoint Formation	22	0	27	1E-06
Torpoint Formation	23	5	27	1E-06

An angle of shearing resistance of 37 degrees has been applied to the Torpoint Formation materials for Run 1D to assess the lowest factors of safety in the waste slopes.

The boundary conditions selected are as follows:

- Annual rainfall between 1200 to 1500mm per year. Infiltration rates of 10%, 20% and 25%.
- Pressure head set in the Torpoint Formation.

The following table presents the range of infiltration rates based on annual rainfall providing steady state conditions:

Rainfall	mm/yr	1200	1500
Rainfall	m/yr	1.2	1.5
Rainfall	m/day	0.00329	0.00411
Rainfall	m/hr	0.00014	0.00017
Rainfall	m/min	2.28E-06	2.85E-06
Rainfall	m/s	3.81E-08	4.76E-08
Infiltration			
10	% / m/s	3.8E-09	4.8E-09
20	% / m/s	7.6E-09	9.5E-09
25	% / m/s	9.5E-09	1.2E-08

A 5% infiltration rate has been applied on the soil slope for Run 1D.

4.4 Cross-Section C Existing Slope

The following conditions are assessed:

- SlopeW1 uses a piezometric surface based on the groundwater monitoring and the negative porewater pressures and suction.
- SlopeW2 does not take account of suction and typically provides a shallow surface soil failure.
- SlopeW3 includes cohesion of 2kPa to model vegetation in the shallow surface soils.

- SeepW allows assessment of the groundwater level rise due to variations in annual rainfall and infiltration rates.
- SlopeW4 is based on the pore-water pressure distribution of SeepW.

The following table summarises the model output as optimised critical slip surface factor of safety and circular factor of safety in brackets for the existing slope:

Run	Slope	SlopeW1 Suction FoS	SlopeW2 No suction FoS	SlopeW3 cohesion 2kPa FoS	SeepW Rainfall infiltration	SlopeW4 FoS
1	Existing	1.394 (1.480)	0.81 (0.814)	0.988 (1.015)	1200m/y 10% 3.8E-09m/s	1.239 (1.325)
1A	Existing	1.394 (1.480)	0.81 (0.814)	0.988 (1.015)	1200mm/y 20% 7.6E-09m/s	1.229 (1.337)
1B	Existing	1.394 (1.480)	0.81 (0.814)	0.988 (1.015)	1200mm/y 25% 9.5E-09m/s	1.230 (1.346)
1C	Existing	1.394 (1.480)	0.81 (0.814)	0.988 (1.015)	1500mm/y 25% 1.2E-08m/s	1.222 (1.356)
1D	Proposed Torpoint Phi 37	1.394 (1.480)	0.81 (0.814)	0.988 (1.015)	1500mm/y 25% 1.2E-08m/s 5% infiltration 1.9E-09m/s on slope.	1.106 (1.142)

The above table provides the following:

- SlopeW1 factor of safety indicates the benefit of suction in maintaining a slope profile of over 30 degrees with an angle of shearing resistance of 28 degrees.
- SlopeW2 indicates slope failure in the absence of matrix suction due to negative porewater pressures.
- SlopeW3 indicates the enhanced effect of surface vegetation in the absence of matric suctions due to negative porewater pressures. This indicates shallow slope failure is possible.

- SeepW provides the porewater pressures due to rainfall infiltration and the potential reduction in matric suctions due to increased porewater pressure. This indicates deeper slope failure is unlikely.

The SlopeW model output is illustrated in Appendix A.

4.5 Cross-Section C Proposed Slope

The proposed slope profile comprises the following:

- Proposed upper slope at 22 degrees.
- 5m bench between upper and lower slope.
- 25 degree lower slope.

The following conditions are assessed:

- SlopeW1 uses a piezometric surface based on the groundwater monitoring and the negative porewater pressures and suction.
- SlopeW2 does not take account of suction and typically provides a shallow surface soil failure.
- SlopeW3 includes cohesion of 2kPa to model vegetation in the shallow surface soils.
- SeepW allows assessment of the groundwater level rise due to variations in annual rainfall and infiltration rates.
- SlopeW4 is based on the pore-water pressure distribution of SeepW.

The following table summarises the model output as optimised critical slip surface factor of safety and circular factor of safety in brackets for the bund of clayey gravel:

Run	Slope	SlopeW1 Suction FoS	SlopeW2 No suction FoS	SlopeW3 cohesion 2kPa FoS	SeepW Rainfall infiltration	SlopeW4 FoS
1	Proposed	1.487 (1.507)	1.143 (1.144)	1.319 (1.381)	1200m/y 10% 3.8E-09m/s	1.531 (1.594)
1A	Proposed	1.487 (1.507)	1.143 (1.144)	1.319 (1.381)	1200mm/y 20% 7.6E-09m/s	1.545 (1.611)
1B	Proposed	1.487 (1.507)	1.143 (1.144)	1.319 (1.381)	1200mm/y 25% 9.5E-09m/s	1.545 (1.618)
1C	Proposed	1.487 (1.507)	1.143 (1.144)	1.319 (1.381)	1500mm/y 25% 1.2E-08m/s	1.547 (1.615)
1D	Proposed Torpoint Phi 37	1.751 (1.856)	1.143 (1.144)	1.319 (1.381)	1500mm/y 25% 1.2E-08m/s 5% infiltration 1.9E-09m/s on slope.	1.555 (1.672)

The above table provides the following:

- SlopeW1 factor of safety indicates the benefit of suction in maintaining a slope profile.
- SlopeW2 indicates a lower factor of safety for shallow slope failure in the absence of matrix suction and negative porewater pressures. Detailing of surface layers is important.
- SlopeW3 indicates the enhanced effect of surface vegetation in the absence of matric suctions and negative porewater pressures. This indicates the shallow slope profile is acceptable.
- SeepW provides the porewater pressures due to rainfall infiltration and the potential reduction in matric suctions due to increased porewater pressure. This indicates deeper slope failure is unlikely.

The SlopeW modelled output is illustrated in Appendix B.

5.0 CONCLUSION AND RECOMMENDATIONS

The stability analysis indicates the existing slope is likely to suffer shallow soil slope failure. This is evidenced on the north flank of the slope. The existing slope should therefore be reprofiled to a less steep angle. An angle of 25 degrees is proposed.

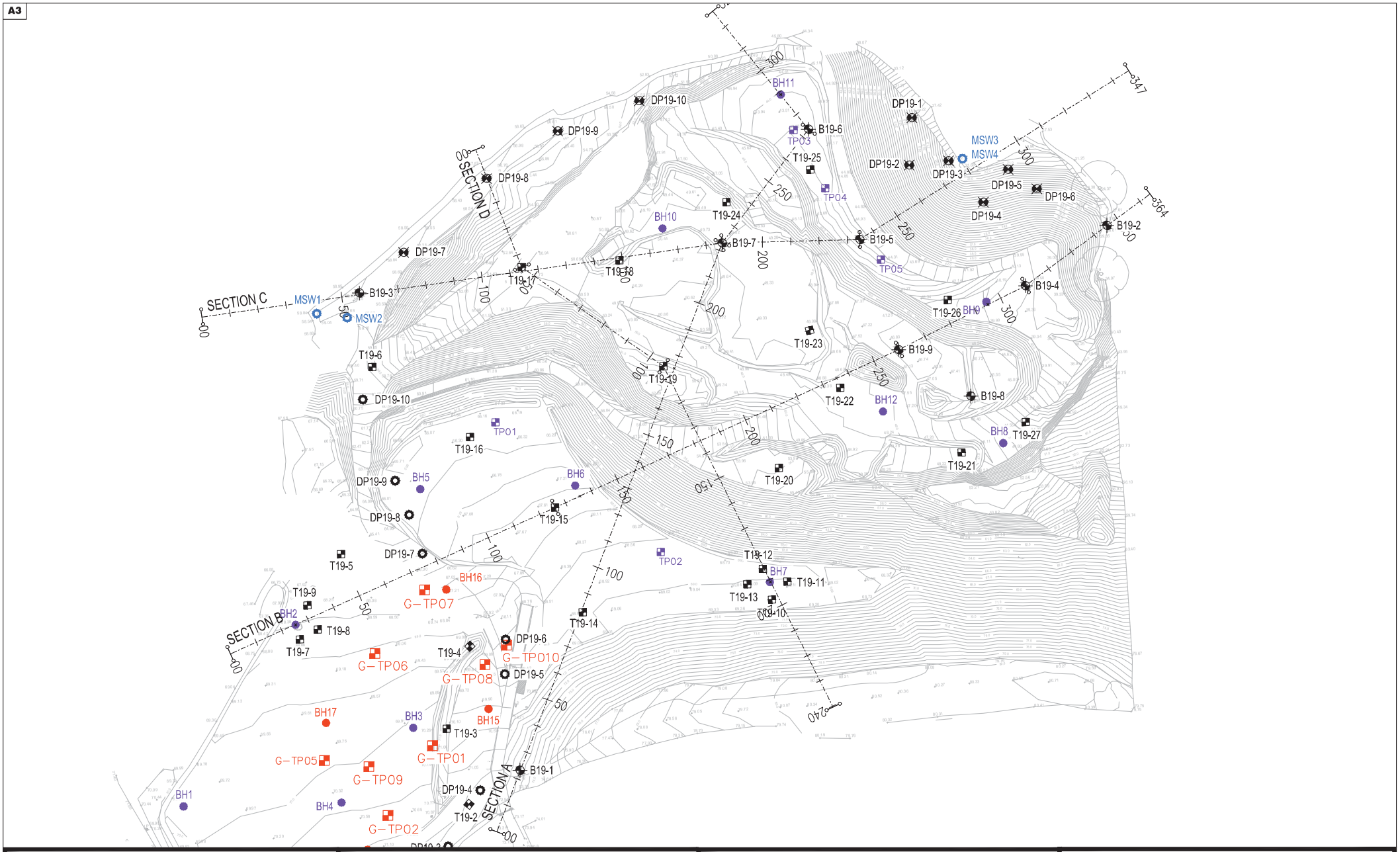
A 5m bench is proposed at the top of the reprofiled lower slope. The slope placed above the existing landform should be placed at 22 degrees.

Slope stability assessment indicates adequate factors of safety for the likely conditions of groundwater, rainfall infiltration, effective stresses due to negative porewater pressures, matric suctions and angle of internal shearing resistance. The most significant factor being the effective stress.

Surface water control and detailing of the slope surface layers is recommended to minimise maintenance and creep movement.

FIGURES

A3



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Client: **Tamar Valley Projects Ltd**

Drawing Status: **For Information**

Job Title: **Eales Farm Landfill**

Dwg Title: **Site Section Locations**

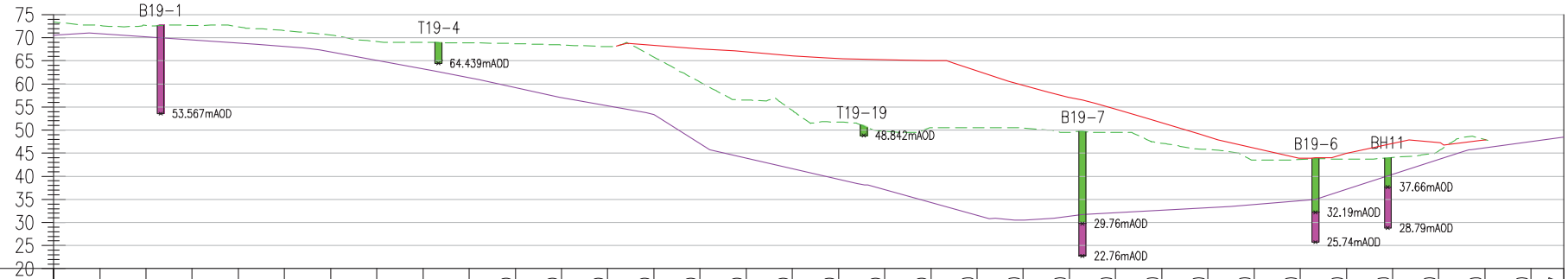
Scale: 1:1250 at A3 | Drawn: RA

Date: APR 2021 | Checked: DLJ

Drawing no: **GCE00692-A20-Fig1**

Rev: -

A3



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EXISTING LEVELS	73.334	72.651	72.665	72.660	72.373	71.537	70.554	69.161	68.986	68.902	68.728	68.438	68.084	65.842	60.410	56.513	54.232	51.760	49.775	50.500	50.513	50.445	49.500	49.500	47.167	45.780	43.500	43.658	43.739	44.042	45.484	47.963		
1970 LEVELS	70.527	70.913	70.223	69.533	68.843	68.125	66.964	65.112	63.261	61.401	59.218	57.070	55.257	53.352	47.063	43.919	41.636	39.353	37.087	34.329	31.570	30.480	31.375	32.137	32.681	33.225	33.909	34.725	37.177	40.410	43.636	46.145	47.531	48.507
PROPOSED LEVELS														68.340	67.587	66.988	66.075	65.519	65.279	65.070	62.829	59.717	57.092	54.528	51.592	48.582	46.125	43.917	44.938	47.096	47.268	47.890		

SECTION A
SCALE: H 1:1000, V 1:1000

FINAL PROFILE

EXISTING PROFILE

1970 TOPO PROFILE

TORPOINT FORMATION

LANDFILL WASTE

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Client:
Tamar Valley Projects Ltd

Drawing Status
For Information

Job Title:
Eales Farm Landfill

Dwg Title:
Cross Section A

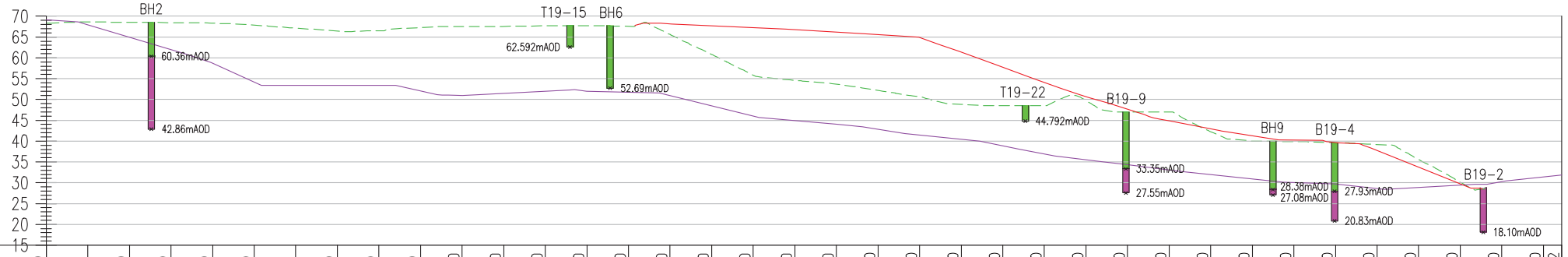
Scale 1:1000 at A3 Drawn RA

Date APR 2021 Checked DLJ

Drawing no:
GCE00692-A20-Fig2

Rev
-

A3



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EXISTING LEVELS	68.299	68.594	68.529	68.464	68.328	67.896	67.136	66.430	66.500	67.250	67.500	67.561	67.705	67.700	67.560	65.594	60.822	55.809	54.608	53.683	52.191	50.618	48.785	48.500	48.500	49.738	46.980	47.000	42.250	39.994	39.887	39.607	39.196	35.568	30.117			
1970 LEVELS	69.118	67.905	64.919	61.932	58.695	54.144	53.340	53.340	53.340	52.039	51.000	51.497	52.000	51.931	51.716	50.929	48.496	46.063	44.970	44.097	42.826	41.466	40.466	38.896	36.940	35.557	34.356	33.052	31.964	30.939	30.071	29.686	28.603	28.850	29.390	30.308	31.390	31.836
PROPOSED LEVELS																68.148	67.712	67.281	66.809	66.188	65.595	64.925	61.336	57.736	54.094	50.695	47.670	44.857	42.917	41.273	40.232	39.643	37.699	33.701	29.703			

SECTION B
SCALE: H 1:1000, V 1:1000

FINAL PROFILE
EXISTING PROFILE
1970 TOPO PROFILE
TORPOINT FORMATION
LANDFILL WASTE

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Client: **Tamar Valley Projects Ltd**

Drawing Status: **For Information**

Job Title: **Eale Farm Landfill**

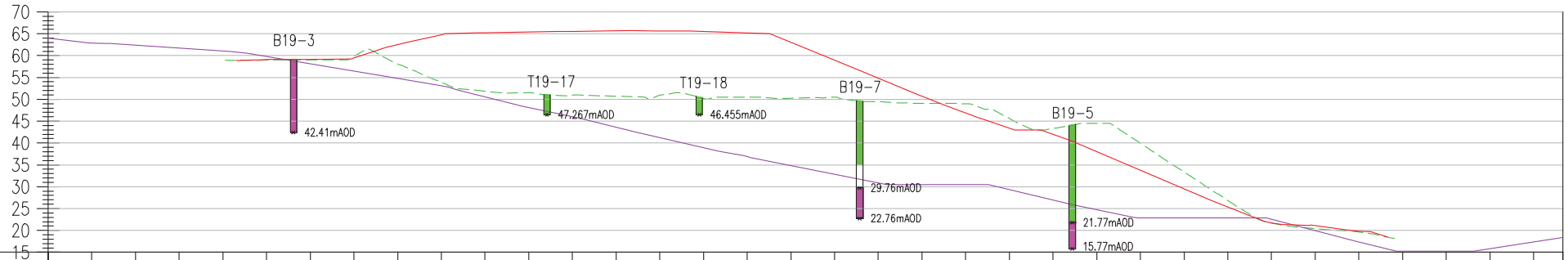
Dwg Title: **Cross Section B**

Scale: 1:1000 at A3 Drawn: RA

Date: APR 2021 Checked: DLJ

Drawing no: **GCE00692-A20-Fig3** Rev: -

A3



CHAINAGE	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000	300.000	310.000	320.000	330.000	340.000	346.666
EXISTING LEVELS						58.992	59.000	59.843	58.075	53.889	51.847	51.510	50.933	50.706	50.925	50.221	50.492	50.259	50.500	49.500	49.099	49.008	45.613	43.301	44.500	39.940	33.339	26.857	21.674	20.431	19.645					
1970 LEVELS	64.023	62.862	62.380	61.722	61.063	59.813	58.139	56.466	54.792	53.086	50.564	48.135	46.026	43.636	41.266	38.945	36.918	34.810	32.867	30.883	30.480	30.480	29.335	26.935	24.765	22.860	22.860	22.860	22.566	19.973	17.386	15.240	15.240	15.823	17.399	18.450
PROPOSED LEVELS						59.058	59.104	59.490	62.503	64.784	65.210	65.389	65.554	65.665	65.671	65.541	65.181	63.032	58.926	54.827	50.747	46.849	43.421	42.015	38.044	33.789	29.535	25.366	21.727	21.058	19.830					

SECTION C
SCALE: H 1:1000, V 1:1000

FINAL PROFILE
EXISTING PROFILE
1970 TOPO PROFILE
TORPOINT FORMATION
LANDFILL WASTE

geo consulting engineering ltd

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Client: **Tamar Valley Projects Ltd**

Drawing Status: **For Information**

Job Title: **Eales Farm Landfill**

Dwg Title: **Cross Section C**

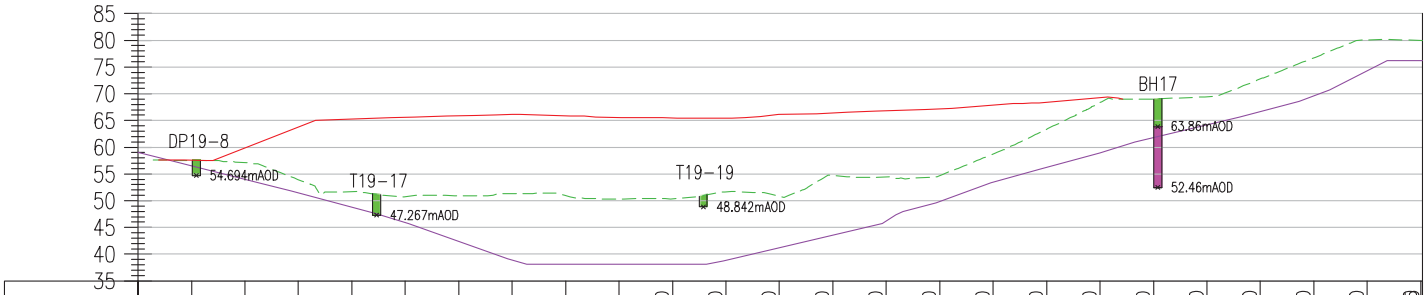
Scale 1:1000 at A3 Drawn RA

Date APR 2021 Checked DLJ

Drawing no: **GCE00692-A20-Fig4**

Rev -

A3



CHAINAGE	00.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000
EXISTING LEVELS		57.514	57.095	53.951	51.696	50.766	50.891	51.297	50.966	50.280	50.351	51.675	50.802	54.696	54.435	54.702	58.732	63.371	68.365	69.002	69.430	72.761	76.701	80.063	80.012
1970 LEVELS	59.046	56.513	53.984	51.439	48.780	45.903	42.387	38.892	38.100	38.100	38.100	38.854	41.197	43.541	46.180	49.886	53.463	56.207	58.951	61.805	64.215	66.698	69.635	74.310	76.200
PROPOSED LEVELS		57.569	59.856	63.743	65.247	65.601	65.911	66.103	65.898	65.577	65.490	65.457	66.147	66.420	66.802	67.145	67.834	68.437	69.283						

SECTION D PV – (214)
SCALE: H 1:1000, V 1:1000

FINAL PROFILE

EXISTING PROFILE

1970 TOPO PROFILE

TORPOINT FORMATION

LANDFILL WASTE

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Client:
Tamar Valley Projects Ltd

Drawing Status
For Information

Job Title:
Eales Farm Landfill

Dwg Title:
Cross Section D

Scale 1:1000 at A3 Drawn RA

Date APR 2021 Checked DLJ

Drawing no:
GCE00692-A20-Fig5

Rev
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APPENDICES

Appendix A – SlopeW Existing Slope.

Appendix B – SlopeW Proposed Slope

Appendix A – SlopeW Existing Slope.

Cross Section C Run 1. Infiltration 10%.

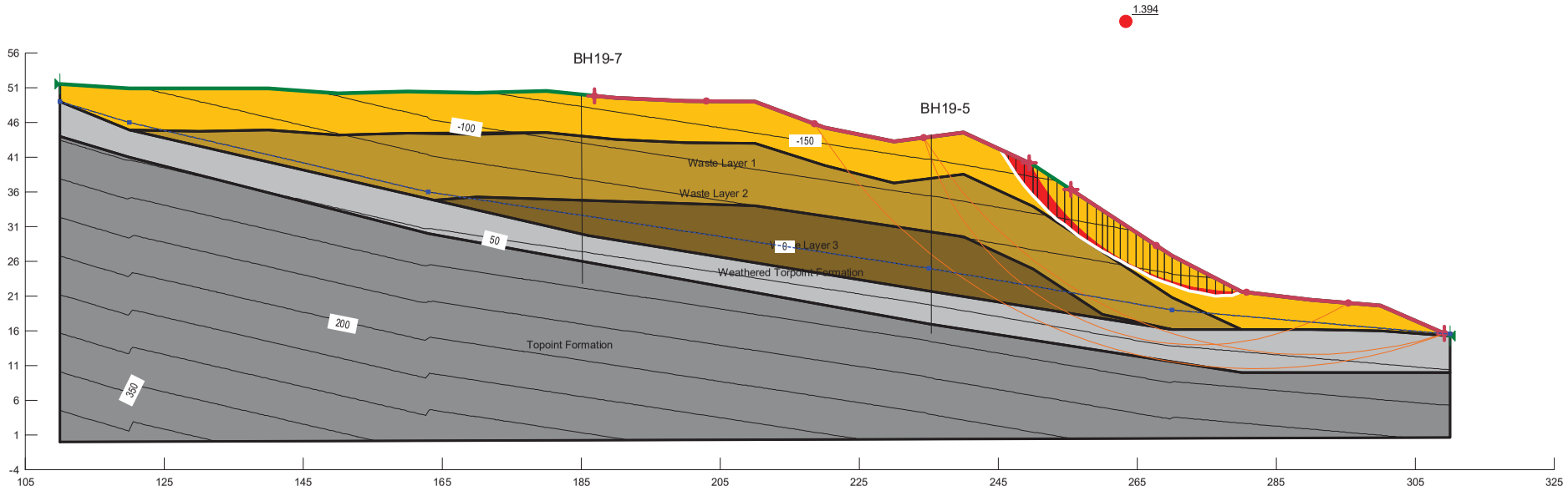
Name: Waste Layer 1 Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 28 ° Vol. WC. Function: Waste Layer 1 Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Waste Layer 2 Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 32 ° Vol. WC. Function: Waste Layer 2 Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Waste Layer 3 Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 34 ° Vol. WC. Function: Waste Layer 3 Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Topoint Formation Model: Mohr-Coulomb Unit Weight: 23 kN/m³ Cohesion': 5 kPa Phi': 27 ° Vol. WC. Function: Torpoint Formation Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Weathered Torpoint Formation Model: Mohr-Coulomb Unit Weight: 22 kN/m³ Cohesion': 0 kPa Phi': 27 ° Vol. WC. Function: Torpoint Formation Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1



Cross Section C Run 1. Infiltration 10%.

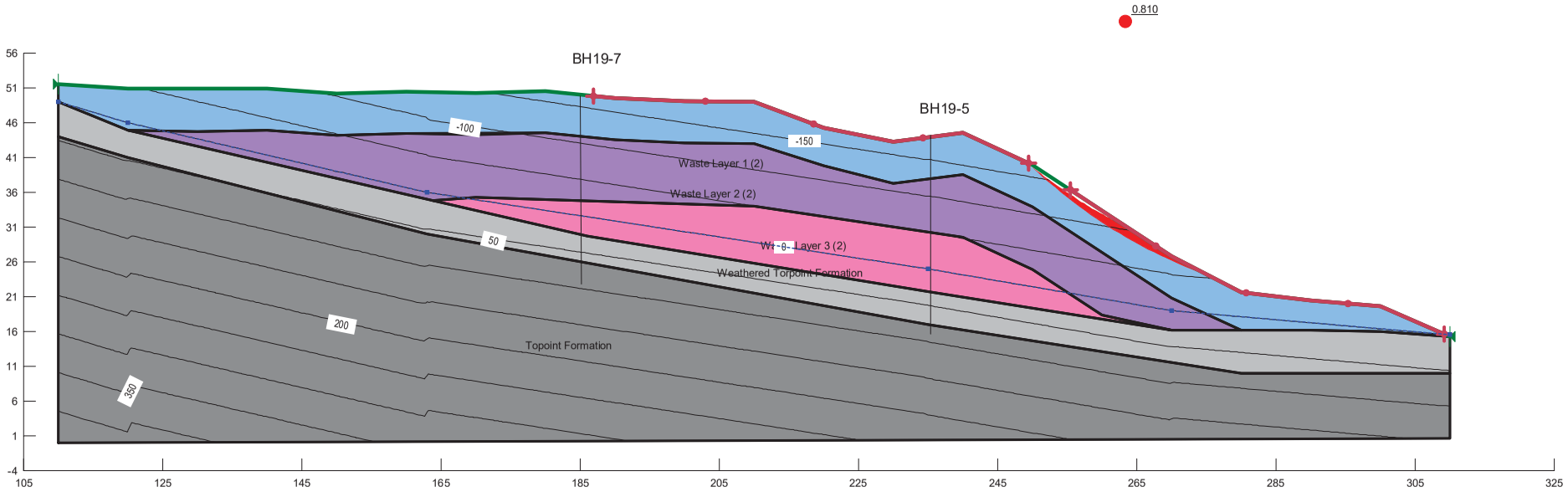
Name: Topoint Formation Model: Mohr-Coulomb Unit Weight: 23 kN/m³ Cohesion': 5 kPa Phi': 27 ° Vol. WC. Function: Torpoint Formation Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Weathered Torpoint Formation Model: Mohr-Coulomb Unit Weight: 22 kN/m³ Cohesion': 0 kPa Phi': 27 ° Vol. WC. Function: Torpoint Formation Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Waste Layer 1 (2) Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 28 ° Phi-B: 0 ° Piezometric Line: 1

Name: Waste Layer 2 (2) Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 32 ° Phi-B: 0 ° Piezometric Line: 1

Name: Waste Layer 3 (2) Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 34 ° Phi-B: 0 ° Piezometric Line: 1



Cross Section C Run 1. Infiltration 10%.

Name: Topoint Formation Model: Mohr-Coulomb Unit Weight: 23 kN/m³ Cohesion': 5 kPa Phi': 27 ° Vol. WC. Function: Torpoint Formation Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Weathered Torpoint Formation Model: Mohr-Coulomb Unit Weight: 22 kN/m³ Cohesion': 0 kPa Phi': 27 ° Vol. WC. Function: Torpoint Formation Residual Water Content (% of Sat WC): 10 % Piezometric Line: 1

Name: Waste Layer 2 (2) Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 32 ° Phi-B: 0 ° Piezometric Line: 1

Name: Waste Layer 3 (2) Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 0 kPa Phi': 34 ° Phi-B: 0 ° Piezometric Line: 1

Name: Waste Layer 1 (3) Model: Mohr-Coulomb Unit Weight: 21 kN/m³ Cohesion': 2 kPa Phi': 28 ° Phi-B: 0 ° Piezometric Line: 1