12. LANDSCAPE AND VISUAL ASPECTS

12.1. Landscape in the Existing Environment

12.1.1. Landscape Description

The landfill footprint is located within the townland of Knockharley and the site is bordered by local roads to the north and east with a typical agricultural landscape to the south and west. A purpose built road links the site to the N2 as shown in Figure 12.1 Landscape Context.

The small (but expanding) village of Kentstown is located approximately 1.0 to 1.5 km south of the site. Several farmhouses and other residential properties are dotted along the county roads surrounding the site. A total of 54 residences lie within 1 km of the landfill footprint.

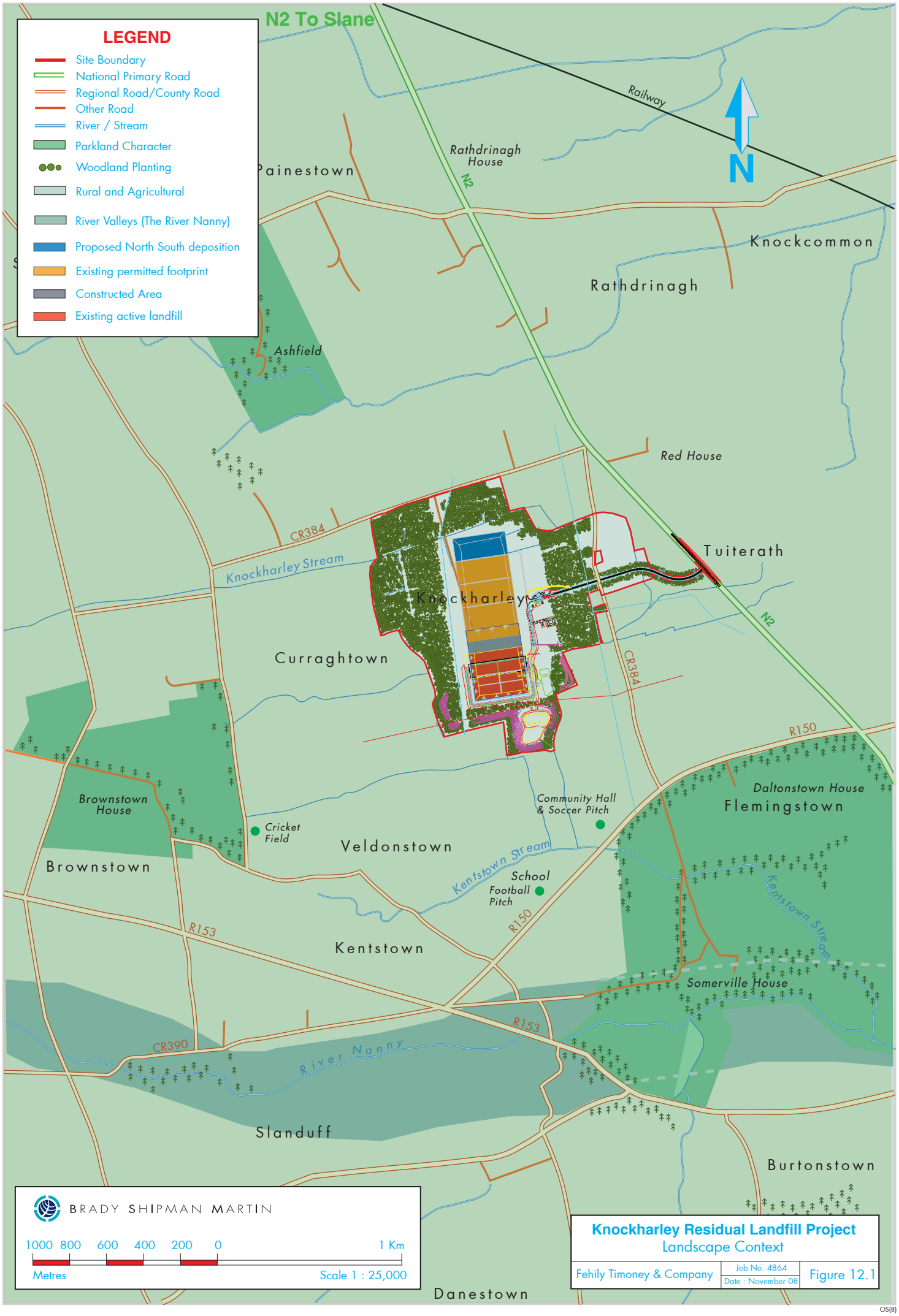
The landscape of the site and its immediate surrounds, excluding Somerville and Flemingstown to the south-east, is of typically rural, unremarkable agricultural land and as such is not of particular scenic or amenity quality (Figure 12.1).

The land use of the surrounding area comprises arable and pasture land, in addition to forestry and the landfill. Field boundaries are defined by strong tree lined hedgerows. Roadside hedgerows are similar but are machine managed in places.

The general topography is low-lying and rises gently from the River Nanny (below 50 m OD) in the south to the low hills at Realtoge (129 m OD) to the west, Kingstown or Carnuff Great (139 mOD) to the north-west and Painestown/Yellow Furze (115 mOD) to the north. Similarly, the topography rises gradually south of the river to the more distant and substantial hills at Skreen (140 m OD) and Tara (159 m OD). To the west, the River Nanny valley falls eastwards past Duleek, between the uplands of Red Mountain (121 m OD) to the north and Bellewstown Ridge (159 m OD) to the south-east.

The site itself, while relatively flat, rises gradually northwards and westward from approximately 50 m at the south-east corner to almost 70 m at the western boundary. The site and surrounding landscape lies within the catchment of the River Nanny which flows west to east, approximately 1.5 km to the south.

Phase 1 of the site construction comprised the greatest visual impact and the most intense visual impact mitigation. At this stage, all external roadworks and internal ancillary infrastructure have been completed with approximately 36% of cells constructed. Virtually all of the screening planting has been undertaken and will grow and mature as the remaining landfill cells are developed.


N2 To Slane
LEGEND
Site Boundary
National Primary Road
Regional Road/County Road
Other Road
River / Stream
Parkland Character
Woodland Planting
Rural and Agricultural
River Valleys (The River Nanny)
Proposed North South deposition
Existing permitted footprint
Constructed Area
Existing active landfill
Railway
N
Rathdrinagh House
Painestown
N2
Knockcommon
Rathdrinagh
Ashfield
Red House
CR384
Knockharley Stream
Knockharley
Tuiterath
N2
Curraghtown
CR384
R150
Daltonstown House
Flemingstown
Brownstown House
Community Hall & Soccer Pitch
Cricket Field
Veldonstown
Brownstown
Kentstown Stream
School
Football Pitch
R150
R153
Kentstown
Kentstown Stream
Somerville House
R153
CR390
River Nanny
Slanduff
Burtonstown
Danestown
BRADY SHIPMAN MARTIN
1000 800 600 400 200 0 1 Km
Metres
Scale 1 : 25,000
Knockharley Residual Landfill Project
Landscape Context
Fehily Timoney & Company
Job No. 4864
Date : November 08
Figure 12.1
OS(8)

12.1.2. Landscape Character

The character of the existing landscape setting is evaluated taking account of the various natural and man-made features, such as topography, landform, vegetation, land-use, built environment etc. together with the visibility of and the views to and from the site.

In general, landscape impacts alter the 'fabric or feel' of the landscape and may arise as a result of:

- change of use,
- removal of existing features,
- alteration of landform and topography,
- visibility of the landscape,
- elevation of the development.

These are addressed as follows:

Change of use

There is no change of use for the proposed development.

Removal of existing features

The proposal will not remove any additional features.

Alteration of landform and topography

The intensification of waste intake will not alter the final-land form when compared with the current permitted development. Clearly, with the current proposal, the final land-form will be achieved sooner and this is seen as a positive impact.

It is also proposed to continue to fill concurrently from the south and from the north, commencing at Phase 7. This will alter the sequence in which the landfill is developed and restored. The south to north development would continue as at present (albeit at a faster rate) but development at the northern part of the landfill will commence much sooner. This would reduce the visual impact from the north because the northern working cells will face south (i.e. towards the southern working cells).

In any case, the considerable hedgerows along the northern boundary of the Greenstar property already have a strong mitigating effect on landfill visibility, the dual-filling proposal will mean that at an early stage, the only visual impact from the north will be the 'back' of an advancing landscaped mound. The proposed change to dual-filling is seen as a positive impact.

Visibility of the landscape

Visual Impacts may be adverse, neutral or positive, can arise under visual intrusion and/or visual obstruction.

Visual Obstruction: is defined as the blocking of a view, and
Visual Intrusion: is concerned with the degree of impingement on a view without actual blocking.

All impacts are rated as described in Table 12.1.which is based on the DETR 'Guidance on the Methodology for Multi-modal Studies' and modified by 'Guidelines for Landscape and Visual Impact Assessment' Second Edition.

Table 12.1: Visual Impact Rating

Impact Rating	Definition
Imperceptible	Not quantifiable or without noticeable consequences.
Slight	Arises where views effected by the proposed scheme form only a small element in the overall panorama or where there is substantial intervening screening in the form of topography and/or vegetation.
Moderate	Arises where an appreciable segment of the existing view is affected or where there is intrusion in the foreground. Changes do not substantially alter the overall scene.
Significant	Arises where the proposed scheme would have a significant effect on the existing view or where the view is obstructed or so dominated by the proposed scheme that is becomes the focus of attention. Generally there will be open views of the development located in the foreground. Visual obstruction may impinge on the skyline.
Profound	Arises where the proposed scheme would so alter the existing visual environment or so completely block an existing view as to entirely eliminate the existing visual character.

Impacts are also classified as **temporary** (associated with construction), **short term** (initial operation prior to mitigation establishment) or **medium term** (lasting between 5 to 20 years) or **long term** (lasting in excess of 20 years) or **permanent** (lasting over fifty years)

Visibility of the landfill site is discussed in Section 12.1.5 "Visibility of the Site within the Landscape".

Landscaping will continue to ensure that any visual impact will at worst be temporary.

Elevation of the development

There will be no changes to elevation.

12.1.3. Landscape Planning

The site and much of its surrounds is of typically rural agricultural landscape and as such is not of particular scenic or amenity quality.

Landscape planning relevant to the site is addressed in the 2007 - 2013 Meath County Development Plan.

The nearest area of Outstanding Landscape is the Boyne Valley, from Navan to Whitehall, 5 km to the north of the landfill footprint. The nearest Area of Scientific Importance is Flemingstown Woodlands (i.e. Somerville demesne) considered of local importance, approximately 1 km to the south-east of the landfill footprint. This is shown in Figure 10.1 "Nature Conservation Designations within 5 km of the Site".

A second area 2 km to the north is identified as, Nr 35 of County Meath, Painestown Quarry, a disused quarry of local importance for its geological interest.

There are no listings of Areas of High Natural Beauty and High Amenity on or near the site, other than the Boyne Valley. Similarly, there are no listings of Tree Preservation Objectives surrounding the site.

There are no Heritage Areas or Listed Views pertaining to the site or its surrounds. The nearest such listings are again at the Boyne and at Skreen Hill some considerable distance from the site.

The Meath County Development Plan 2007-2013 categorises areas within the county geographically as Landscape Character Areas (LCAs). Knockharley landfill is located in LCA 6 Central Lowlands.

This character area is described as being composed of rolling drumlins interspersed with numerous large estates and associated parkland. Typical land cover is thick wooded hedgerows, with some conifer plantations, and shelterbelts of ash and larch and separate medium to large fields. Deep roadside drainage ditches and banked hedgerows are a common feature of the landscape in the enclosed rural road corridors.

Views within this area are generally limited by the complex topography and mature vegetation except at the tops of drumlins where panoramic views are available particularly of the Hill of Tara uplands and Skryne Church. Short-range views are channelled along narrow valleys between drumlins and often along road or river corridors.

The nearest Natural (listed National on Map) Heritage Area is the woodlands at Flemingstown (Somerville) located approximately 2.5 km south-east of the site.

Two houses, two churches and a monument are listed as protected structures as per Table 12.2 below detailed in the Meath County Development Plan 2007-2013.

Table 12.2: Protected Structures

County Development Plan Reference	Structure	Grid Reference	Location
MH032-119	Kentstown Glebe	Grid Ref: 97.65.	Kentstown
MH032-124	Somerville	Grid Ref: 98.65.	10 km south of Slane
MH032-117	St Marys Roman Catholic Church	Grid Ref: 97.65.	10 km south of Slane
MH032-120	St Marys Church of Ireland Church	Grid Ref: 97.65.	10 km south of Slane
MH032-122	Kentstown –Lions Mouth House Trough	Grid Ref: 13N 97.65	2 km south-east of Kentstown

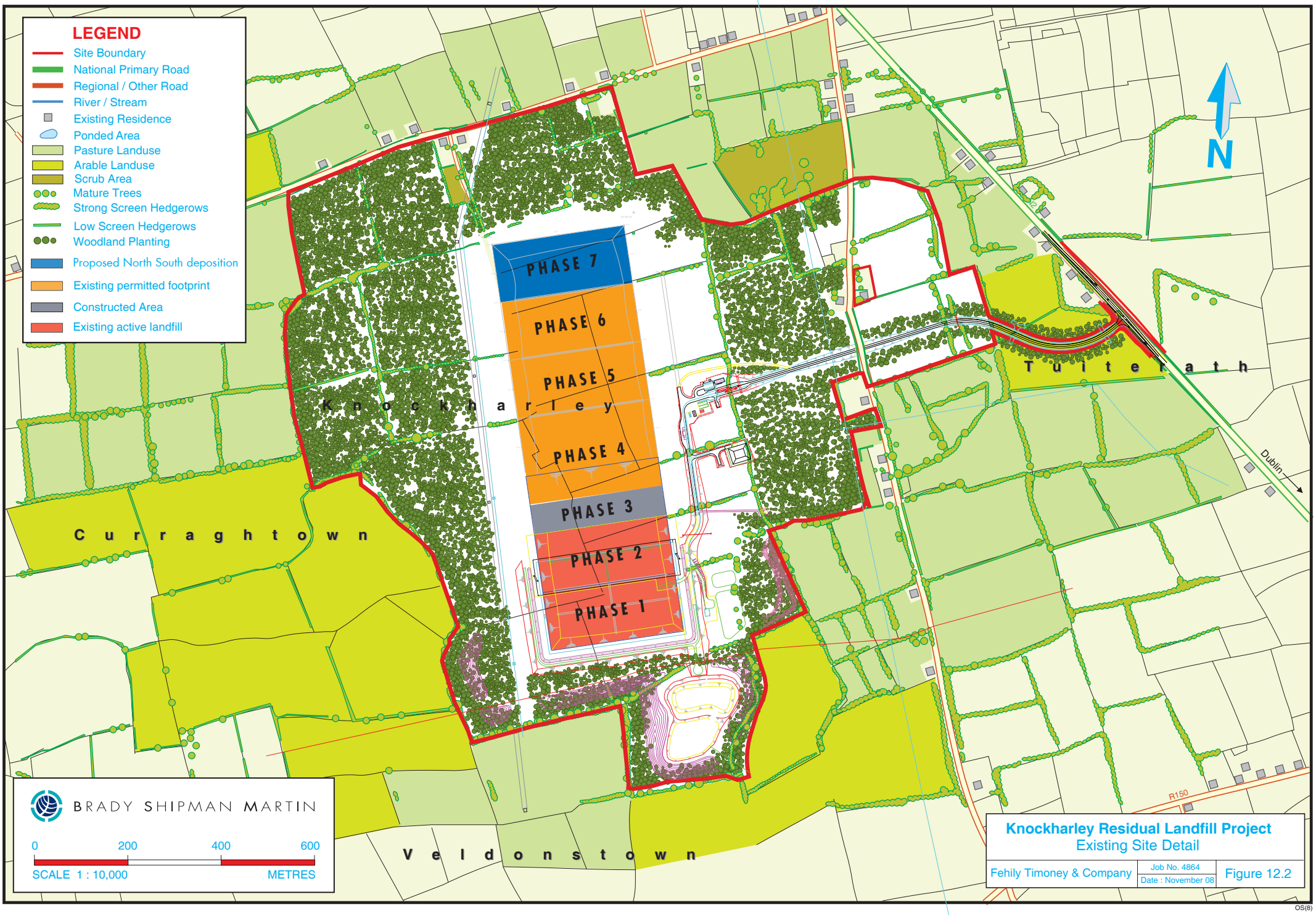
12.1.4. Landscaping around the Site

The landfill is set in a landscape of mainly rural character where natural features such as agricultural fields, hedgerows and trees predominate. This landscape is typical of much of County Meath with its strong tree-lined hedgerows and small woodland copses. Therefore a landscape design which replicated such patterns and features in a 'natural approach' was adopted for the landscape amelioration.

To complement existing tree-lined hedgerows, a minimum 50 m wide belt of predominantly native mixed woodland was established on all boundaries of the main landfill site area extending to over 112 acres of new woodland. Over 100,000 individual plants comprising Ash, Beech, Larch, Maple, Oak and Pine species were planted at a variety of sizes from 1 m to 3 m in height.

To the south of the landfill, a 5 m high planted berm was established along the site boundary to give immediate screening in advance of plant establishment. A large wetland was provided near the southern boundary and planting established around this feature in keeping with a wetland habitat.

See Figures 12.2 and 12.3 for details of the current status on landscaping and post closure landscaping of the facility.


LEGEND
Site Boundary
National Primary Road
Regional / Other Road
River / Stream
Existing Residence
Ponded Area
Pasture Landuse
Arable Landuse
Scrub Area
Mature Trees
Strong Screen Hedgerows
Low Screen Hedgerows
Woodland Planting
Proposed North South deposition
Existing permitted footprint
Constructed Area
Existing active landfill
PHASE 7
PHASE 6
PHASE 5
PHASE 4
PHASE 3
PHASE 2
PHASE 1
K n o c k h a r l e y
C u r r a g h t o w n
V e l d o n s t o w n
T u i t e r a t h
N
Dublin
R150
BRADY SHIPMAN MARTIN
0 200 400 600
SCALE 1 : 10,000 METRES
Knockharley Residual Landfill Project
Existing Site Detail
Fehily Timoney & Company
Job No. 4864
Date : November 08
Figure 12.2
OS(8)

Scale 1:7500

N2 to Slane

County Road CR384

CR384

Hedgerows Retained for Screening

N2 to Ashbourne

Native Woodland Boundary Planting. Minimum 50M Deep

Proposed Hedgerows

Stormwater (Wetland) Lagoon

Average 5m High Planted Screen Mound

220KV Line

CR384 To Kentstown

Legend

- Existing Tree
- Existing Large Hedgerow
- Existing Small Hedgerow
- Woodland Planting
- Wetland Planting
- Hedgerow Planting
- Reinstated Phase

BRADY SHIPMAN MARTIN

Knockharley Residual Landfill Project

Post Closure of Project

Fehily Timoney & Company

Job No. 4864

Date : November 08

Figure 12.3

12.1.5. Visibility of the Site within the Landscape

The site has a good degree of inherent screening from mature hedgerows along the roads and field boundaries and from the berms and screen planting undertaken at the facility to date. Visibility tends to be confined to views of the perimeter fence in the immediate surrounds of the landfill with long distance views of the landfill at greater distance from the facility at approximately 1km from the site boundary.

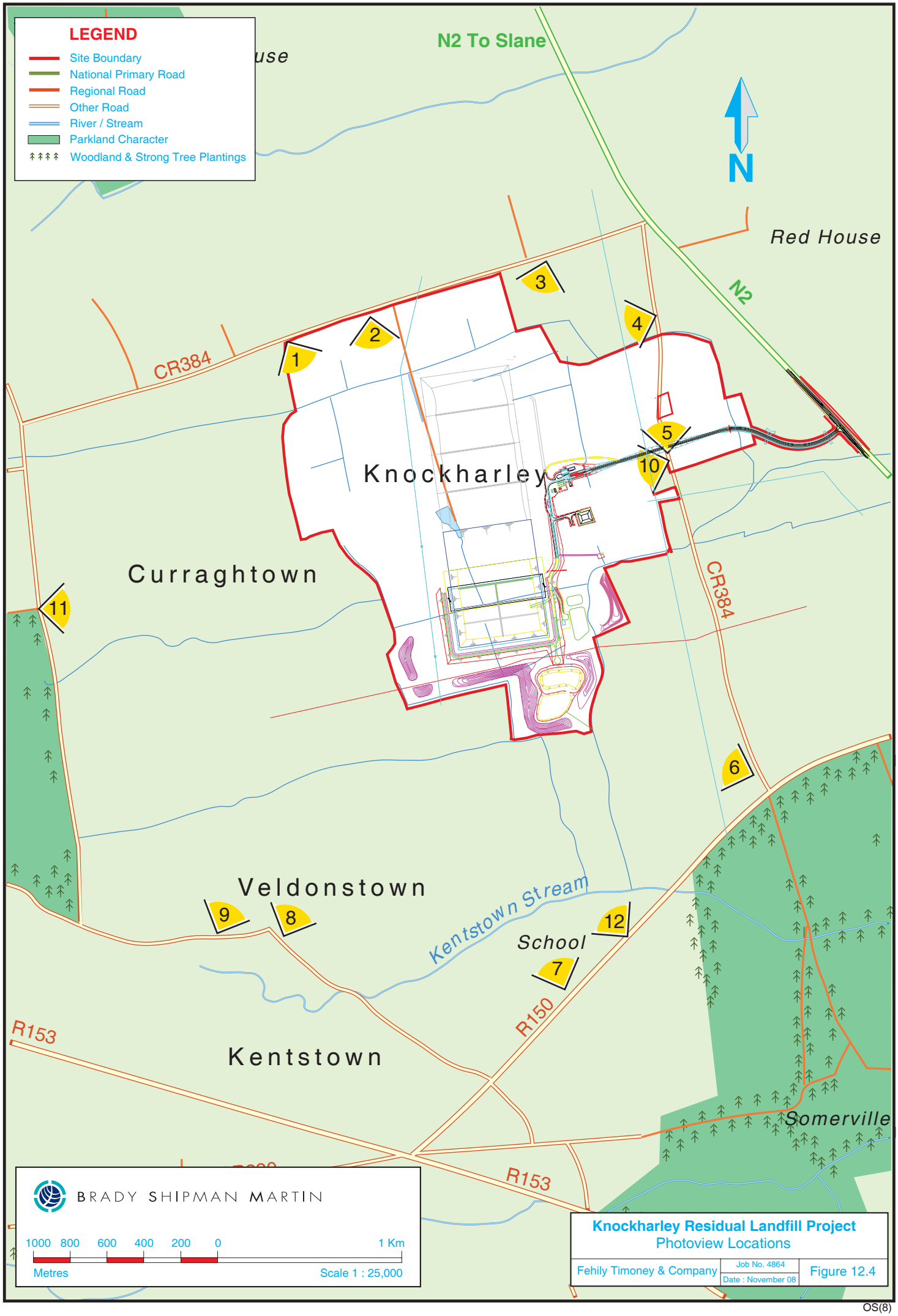
A number of the viewpoints (VP1 to VP9), which were also included in the EIS submitted as part of the original landfill application in 2001, are presented to demonstrate the effectiveness of the existing topographical and landscape screening. This combined with the comprehensive landscape screening programme implemented by Greenstar at the development effectively screens the landfill operations from view. The viewpoint locations are presented in Figure 12.4.

Photographs were taken from additional locations in the vicinity of the landfill (VP10 to VP12) on 21st August 2008. While the current development was invisible from VP10 taken along the overpass, only distant views of landfill operation were evident at VPs 11 and 12.

Table 12.3: Viewpoint Locations

Photo Location 21 August 2008	Visibility	Impact
VP1 - Along minor road to the north of the landfill (near original photo 1)	Visibility restricted to very top of landform in background of VP1 photograph. Existing boundary planting restricts visibility of most of landform	Slight
VP2 - Along minor road to the north of the landfill (near original photo 2)	No visibility	Imperceptible
VP3 - Along minor road to the north of the landfill (near original photo 3)	No visibility of site	Imperceptible
VP4 - Along minor road to the east of the landfill (near original photo 4)	No visibility of site	Imperceptible
VP5 - Along minor road to the east of the landfill (near original photo 5)	Overpass fencing only visible, impact is restricted to views along the site access road.	Imperceptible
VP6 - Along minor road to the east of the landfill (near original photo 6)	No visibility of site	Imperceptible
VP7 - Along minor road to the south of the landfill (near original photo 7)	Distant views (>1 km) of the landfill, some of landform visible	Slight
VP8 - Along minor road to the south of the landfill (near original photo 8)	No visibility of site	Imperceptible
VP9- Along minor road to the south of the landfill (near original photo 9)	No visibility of site	Imperceptible
VP10-View of site along centreline of overpass	No visibility of landfill operations, visibility limited to entrance	Imperceptible

Photo Location 21 August 2008	Visibility	Impact
VP11-View of site from county road near Curraghtown.	Distant views (>1 km) from current operations, most of landform visible	Slight (as landform does not impinge on foreground)
VP12 From R150 looking north	Distant views (>1 km) of truck on the landfill, most of landform visible	Slight (as landform does not impinge on foreground)


LEGEND
Site Boundary
National Primary Road
Regional Road
Other Road
River / Stream
Parkland Character
Woodland & Strong Tree Plantings
N2 To Slane
N
Red House
N2
CR384
Knockharley
Curraghtown
Veldonstown
Kentstown
Kentstown Stream
School
R153
R150
Somerville
1
2
3
4
5
6
7
8
9
10
11
12
BRADY SHIPMAN MARTIN
1000 800 600 400 200 0 1 Km
Metres
Scale 1 : 25,000
Knockharley Residual Landfill Project
Photoview Locations
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Job No. 4864
Date : November 08
Figure 12.4

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Figure 12.5: View of Site from Original Photoview Location 1

Figure 12.6: View of Site from Original Photoview Location 2

Figure 12.7: View of Site from Original Photoview Location 3

Figure 12.8: View of Site from Original Photoview Location 4

Figure 12.9: View of Site from Original Photoview Location 5

Figure 12.10: View of Site from Original Photoview Location 6

Figure 12.11: View of Site from Original Photoview Location 7

Figure 12.12: View of Site from Original Photoview Location 8

Figure 12.13: View of Site from Original Photoview Location 9

Figure 12.14: View of site along centreline of overpass (Location 10)

Figure 12.15: View of site from county road near Curraghtown (Location 11)

Figure 12.16: View From R150 looking north (Location 12)

Based on the limited visibility of the current development as shown in the viewpoints, the impact rating can be deemed to be imperceptible as per Table 12.1.

12.2. Potential Impact of the Proposed Development on Landscape and Visual Impacts

The intensification of waste intake will not alter the final-land form when compared with the current permitted development. Clearly, with the current proposal, the final land-form will be achieved sooner and this is seen as a positive impact.

It is also proposed to continue to fill concurrently from the south and from the north, commencing at Phase 7. This will alter the sequence in which the landfill is developed and restored. The south to north development will continue as at present (albeit at a faster rate) but development at the northern part of the landfill will commence much sooner. This will reduce the visual impact from the north because the northern working cells will face south (i.e. towards the southern working cells).

In any case, the considerable hedgerows along the northern boundary of the Greenstar property already have a strong mitigating effect on landfill visibility, the dual-filling proposal will mean that at an early stage, the only visual impact from the north will be the 'back' of an advancing landscaped mound. The proposed change to dual-filling is seen as a positive impact.

12.3. Mitigation

No additional mitigation measures are required.

The proposal has a positive effect in that the site will be restored sooner.

Although some 50 acres of surrounding forestry was proposed for this development in the EIS submitted as part of the original landfill application in 2001, with its planting to be phased in accordance with cell development, Greenstar has in fact already put in place approximately 112 acres of forestry. This means that the appropriate perimeter landscape mitigation measures for the entire licensed phase 7 are already in place and filling of Phase 7 can commence with the positive landscape and visual impacts detailed in Section 12.2.

13. HUMAN BEINGS & MATERIAL ASSETS

13.1. Human Beings in the Existing Environment

The Knockharley lanfill is located in a rural area with local housing comprising a mixture of farm houses and detached residential single-family dwellings.

Kentstown village lies 1.5 km south of the landfill footprint. Kentstown National School is approximately 1 km from the disposal area. A pre-school opened during September 2006 on the R150 approximately 1.5 km from the landfill footprint. A Montessori pre-school has opened in Kentstown village since the landfill received planning permission.

There are 147 no. houses within 1 km of the boundary (a figure that changes because of ongoing development). Figures 13.1 shows the current housing development based on An Post Geodirectory dataset revised April 2008.

Other population centres in the area include Slane village located 7 km north of the site, the town of Duleek located 7 km to the east and the town of Navan, 10 km to the west.

This chapter discusses potential impacts to human beings from the proposed intensification of waste intake and dual filling from the south and north.

Images Reproduced Under License from GoogleTM

Fehily Timoney & Company

Dwellings in Vicinity of Site

Figure 13.1

13.2. Potential Impacts on Human Beings

13.2.1. Human Health

Knockharley landfill is licensed for the disposal of residual, non-hazardous household, commercial and industrial waste under the Waste Licence reference W0146-01. Its design reflects the standard set for landfilling in the EU Council Directive on the Landfill of Waste. The Directive states as its overall objective Overall objective

> *1. With a view to meeting the requirements of Directive 75/442/EEC, and in particular Articles 3 and 4 thereof, the aim of this Directive is, by way of stringent operational and technical requirements on the waste and landfills, to provide for measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from landfilling of waste, during the whole life-cycle of the landfill.*

The main potential risks to the human health could arise from:

- Contamination of surface water or groundwater

There are no additional risks to surface water and groundwater quality related to the proposed intensification of waste intake and dual northern and southern cell filling. The proposal will, in fact, hasten the landfill closure and will, therefore, reduce the risk to surface water and groundwater. Surface water and groundwater quality are discussed in sections 8 and 9 respectively. There have been no negative impacts on surface water or groundwater quality from landfilling operations on the site from commencement of operations in December 2004.

- Odour, dust & vermin

As part of the site's waste licence conditions, dust deposition monitoring and PM_{10} monitoring is conducted at a number of locations around the site. Schedule D.3. requires that dust and PM_{10} monitoring be carried out at monthly and quarterly frequencies respectively. Dust deposition levels of 350 mg/ m^2/ day are employed based on the 2002 TA Luft emission value for protection against significant nuisances from dustfall. A PM_{10} trigger value of 50 µg/m^3/ day is employed based on current Irish legislation (SI No. 271 of 2002 – Air Quality Standards Regulations 2002) for protection of human health.

Odour can arise from fresh waste in the active cells and from waste in various stages of decay in other cells. Odour mitigation measures (effective daily cover and odour masking) are employed where fresh waste is being landfilled to prevent off-site odours (see Section 14.1). In relation to older waste the main potential source of odour is landfill gas which arises from the decomposition of biodegradable waste in the absence of oxygen. The

landfill's basal lining system guarantees that the gas will not seep through the ground resulting in a hazard. As the waste is placed, gas-vents are constructed to allow gas to be collected and managed. After the waste is placed, the gas vents are connected to a flare located at the gas flare compound, that combusts the gas. Landfill gas comprises trace odorous components that are destroyed in the flare. A gas-engine and generator will be installed at the site in the near future to utilise the gas.

The proposed intensification in waste acceptance will reduce the number of years where waste is being handled and thus reduces the potential for odour generation to a shorter time period. Furthermore, this proposal together with the implementation of national waste policy will reduce the potential of landfilled waste being odiferous. This is due to the changing characteristics of the residual waste to be landfilled, which will comprise progressively less biodegradable waste and increasing volumes of MBT stabilised waste and other stabilised residual waste from recycling activities, as well as non-putrescible construction wastes.

It is proposed to develop a second working face at the north end of the landfill void starting at Phase 7 for the deposition of stabilised waste and other wastes suited for disposal separately to biodegradable waste. This second working face is consistent with the company's objective to have proper regard to the protection of the amenity of adjoining property including residential property. It is also consistent with contemporary scientific advice.

Continuation of existing vermin and birdcontrol measures (which have been successful) will ensure that vermin numbers are controlled. The proposed separate deposition of certain wastes at the northern end of the site will reduce the potential for odour emissions.

- Sub-surface migration of landfill gas

All waste has and will be placed in fully lined cells, isolated from the environment. The lining system is a barrier to both leachate and landfill gas. There are thus no additional risks of landfill gas migration associated with the proposed intensification of the disposal rate.

13.2.2. Air Quality

Although there will be a faster production rate of landfill gas and the peak generation will occur sooner for an intensified waste intake (see Section 3.4.2), it will be actively abstracted and directed for flaring and utilisation. The overall quantity will not be altered by the accelerated filling but the efficiency of extraction and the economics of gas utilisation will be increased.

13.2.3. Noise

The proposed intensification of waste intake and dual filling of southern and northern phases will result in increased HGV traffic delivering waste loads and additional noise sources in the northern end of the landfill footprint which have not been present to date.

In order to assess the noise impact to neighbouring properties a model was run using the traffic study data for the estimated numbers of HGVs to take in the increased quantities of waste proposed under intensification of waste intake (Section 6 Traffic) together with the site plant continuously operating and the proposed three engine gas utilisation plant. In addition the landfilling equipment employed for existing landfilling operations were duplicated in the northern cells at Phase 7 to represent filling operations in these cells. All sources were described as operating 100% of the time to model for worst case scenario. In reality the equipment would not be operating for the full extent of the time and not at night bar the gas flare.

Receptors were placed in the model to represent the closest dwellings on the northern and eastern boundaries as they would experience the greatest noise impact.

Based on the model, noise levels from the site will remain in compliance with the EPA waste licence daytime limit of 55 dB(A) from activities associated with dual filling of the northern and southern phases and intensification of waste intake. Noise is fully discussed in Section 6.

13.2.4. Property Values

There is a perception that property values will be depressed by the proximity to a landfill.

The view expressed in the ABP Inspector's Report (planning permission reference 01/5006, An Bord Plenala reference PL17.125891) with regard to the potential for property devaluation at Knockharley was that it was *"likely that with strict environmental controls in place and the visual integration of the site within the surrounding landscape that perceived disamenities and corresponding property devaluation would be of a short-term nature only".* This is reiterated in the ABP Inspectors Report for the 2006 planning application (planning permission reference NA/ 60336, An Bord Pleanala Reference PL 17.220331) where the inspector repeats the previous reports conclusion that "*perceived disamenities and corresponding property devaluation would be of a short-term nature only*" and that "*In the context of the permitted landfill and the location of the proposed extension, it is considered that the inclusion of the triangular shaped area to the north west will have no significant impact on the value of the properties owned by Faulkner & Doonan to the east of the site.*"

There is no evidence that property prices in this part of County Meath are underperforming compared with other similar parts of the country.

The proposed intensification of waste acceptance will hasten the filling and closure of the facility and will remove any perceived negative impacts on property values in a shorter time-frame than currently planned.

A tonnage-based community levy of €1.89 per tonne has been agreed with Meath County Council and approximately €500,000 has been lodged with the local authority in compliance with the planning permission to date with another c.€270,000 to be paid this

year. This money has been used to fund projects in the locality of the landfill. It was accepted in the An Bord Pleanala report for the original planning application that such a levy would have a positive effect on property values (planning report July 2002, An Bord Plenala reference PL17.125891).

13.2.5. Landscape Interference

The intensification of waste intake will not alter the final landform when compared with the current permitted development. Clearly, with the current proposal, the final land-form will be achieved sooner and this is seen as a positive impact.

It is also proposed to continue to fill concurrently from the south and from the north. This will alter the sequence in which the landfill is developed and restored. The south to north development will continue as at present (albeit at a faster rate) but development at the northern part of the landfill will commence much sooner. This will reduce the visual impact from the north because the northern working cells will face south (i.e. towards the southern working cells.

In any case, the considerable hedgerows along the northern boundary of the Greenstar property already have a strong mitigating effect on landfill visibility, the dual-filling proposal will mean that at an early stage, the only visual impact from the north will be the 'back' of an advancing landscaped mound. The proposed change to dual-filling is seen as a positive impact.

Landscape and visual impact is fully discussed in Section 12.

13.3. Mitigation Measures

An increase in landfilling waste to 400,000 tpa will have the combined positive effect of shortening the period when the perception of disamenity is at a maximum and bringing forward the contribution to the community fund. The community fund is tonnage based and will increase in accordance with accepted waste. The fund currently accrues at approximately €250,000 per annum but this would increase to approximately €750,000 per annum should permission be granted, thereby providing even more funding for local projects.

The proposed intensification is in itself an odour mitigation measure due to the changing characteristcs of waste to be disposed (see Chapter 14 'Air Quality'). In addition the intensification will mean that the gas capture efficiency will increase as final capping will be placed sooner.

No additional mitigation measures are required in relation to the protection of human health or property.

14. AIR QUALITY

14.1. Air Quality in the Existing Environment

Air quality in the existing environment is discussed under the headings of odour, landfill gas and dust including PM_{10}.

The landfill is located in a rural environment and the existing air quality around the development site can be determined by reference to the air quality monitoring data presented in Appendices 8 and 9. All monitoring is conducted as per Condition 6 and Schedule D of EPA waste licence (W0146-01). The air quality monitoring stations are indicated on Figure 3.2 "Environmental Monitoring Locations".

The EPA has audited the Knockharley landfill site on four separate occasions (07 March 2005, 11 April 2006, 16 May 2007 and 03 April 2008) with no non-compliances noted.

Odour

A number of odour complaints have been received by local residents. Greenstar promptly investigates all odour complaints. In most cases evidence of the odour reported cannot be detected. This may be due to the fact that the odour reported may have been of a very low intensity when experienced, and it is no longer present at the time of the investigation. In some instances the complaints are not lodged for a considerable time following the period to which the complaint refers. Notwithstanding the difficulty to obtain evidence to substantiate the odour complaints, Greenstar has implemented odour mitigating measures. These are in addition to the requirements of the waste licence and are in excess of the measures implemented by other waste management companies.

The mitigation measures include careful scrutiny and screening of waste intake to prevent particularly odourous material being accepted at the landfill for disposal. Regular patrols of the site are undertaken to examine for any odour problems and any complaints received are promptly investigated.

The primary odour control is the use of daily cover in accordance with the provisions of the waste licence. Daily cover comprises a minimum of 150 mm soil-like material covered with a 100 mm deep layer of woodchip, the latter being a well documented medium used to treat odourous compounds in bio-filters. Before being covered the waste is compacted. The immediate compaction of the waste within a small controlled area serves to minimise the available area for odours to escape from the daily tipping area.

The progressive development of the landfill gas collection and treatment infrastructure enhances odour control as landfill gas combustion effectively destroys its odourous compounds. A high density of landfill gas extraction points have been installed at the landfill that are connected to modern state-of-the-art gas flares. A gas-engine and generator will be installed at the site in the near future to utilise the gas.

Another odour control system employed on site comprises a fog spray odour masking system. This system is installed along the litter fence, along the aviary hedgerow and as multi-nozzle stands at the working face. The system releases a fog of odour neutraliser comprising natural oils. The system is not used continuously but is always used when the prevailing wind threatens off-site odour migration.

There is a minimum distance buffer of 250m from the waste disposal area to the nearest residential property. This provides for significant attenuation of any potentially odourous gases.

Leachate is removed regularly by a licensed waste contractor thus minimising the potential for odours which can form as a result of leachate stagnating and becoming anaerobic. The leachate lagoon is covered.

Landfill Gas

Landfill gas emissions are monitored according to Schedule C.3. of the site's waste licence, 20% LEL (1% v/v) methane and 1.5% v/v carbon dioxide on a monthly basis. Appendix 5 lists the monthly monitoring results from the 19 no. landfill gas monitoring wells located outside the waste body from 2006 to September 2008.

Methane levels exceeding the 1% v/v emission limit value were recorded in LG03 in October and November 2006 and from June to September 2007. LG03 was installed in quarter 2 2006 following construction of an access road and the gas flare over the original well location. The construction of the monitoring well led to accumulation of surface water in the monitoring well where stagnation of the standing water led to anaerobic conditions and generation of methane.

There have been no other exceedances of the methane ELV and landfill gas has remained in the body of the waste.

Exceedances of the carbon dioxide ELV have occurred from 2006 to September 2008. These exceedances are caused by the presence of naturally occurring carbon dioxide which was previously detected in monitoring undertaken in February and March 2005 before waste was deposited in the cells.

A report on SO_2 emissions was carried out by external consultants in July 2008 at the request of the EPA, with a view to assessing the dispersion of SO_2 emissions from combustion plant at the site. The modelling took into account current and expected landfill gas utilisation/combustion infrastructure over the period until 2021.

Dust

As part of the site's waste licence conditions, dust deposition monitoring and PM_{10} monitoring is conducted at a number of locations around the site. Schedule D.3. requires that dust deposition and PM_{10} monitoring is carried out at monthly and quarterly

frequencies respectively. Dust deposition levels of 350 mg/ m^2/ day are employed based on the 2002 TA Luft immission value for protection against significant nuisances from dustfall. A PM_{10} trigger value of 50 µg/m^3/day is employed based on current Irish legislation (SI No. 271 of 2002 – Air Quality Standards Regulations 2002) for protection of human health.

Dust deposition data for 2006 to quarter 3 2008 is presented in Appendix 8. Exceedances were noted of 350 mg/ m^2/ day at four dust monitoring locations in 2006 but these exceedences were related to off-site dispersion of seed and pollen and were not caused by on-site activities. There have been no exceedances since this time.

PM_{10} monitoring data is presented in Appendix 9. For the period 2006 to quarter 3 2008, there was one non-compliance with the waste licence trigger level of 50 µg/m^3/day in March 2007 at PM1 located away from the landfill footprint, at the site boundary. All the PM_{10} locations located closer to the landfill had significantly lower results. The recorded exceedance was caused by traffic on adjacent roads and not by landfill activities.

Whenever conditions that could exacerbate dust nuisance (dry, windy) exist, dust is controlled by water spray. Prompt daily cover and speed restrictions are also applied. To date, dust deposition and PM_{10} emissions from the current development including landfill cell construction and operation have not resulted in a breach of licence trigger levels. This demonstrates the success of current control measures.

14.2. Potential Impacts on Air Quality

Odour

The changing characteristics of residual waste to be landfilled which will comprise progressively less biodegradable waste and greater volumes of MBT stabilised waste and other stabilised residual waste from recycling activities, will reduce the potential for odour generation. In addition the use of northern cells (Phase 7) for stabilised wastes and wastes suited for disposal separately to biodegradable waste will further reduce the potential for odour generation.

The proposed intensification will reduce the potential for odour generation and will have a positive impact on air quality.

Landfill Gas

The proposed intensification will accelerate the provision of capping and LFG collection infrastructure thus increasing the overall efficiency of the LFG management system. Landfill gas will continue to be directed for flaring and utilisation. There will be a faster production rate of landfill gas and the peak generation will occur sooner. The overall quantity will not be altered by the accelerated filling but the efficiency of extraction and the economics of gas utilisation will be increased. This is a positive impact on air quality.

Planning permission (Reg. Ref No. NA/70015) was granted by Meath County Council in April 2007 for the installation and operation of a gas utilisation plant. The proposed plant

will be phased and will generate up to 4.2 MW of electricity for input into the national grid. There will be three landfill gas engines generating approx 1.4 MW of power each with an enclosed flare ESB substation and switch room. Greenstar is awaiting connection to the national grid and it is envisaged that the first gas engine will be installed and operation in 2009 pending the grid connection. The Knockharley facility is therefore classed as a facility for residual disposal with energy recovery.

Dust

Increased traffic and the establishment of a second working face have the potential to increase dust generation. The current rigorous dust control measures employed on site such as speed restrictions, routinely spraying of road with water and daily cover on the working faces will ensure air quality does not deteriorate.

14.3. Mitigation Measures

Odour

Existing mitigation measures as detailed in Section 14.1 will continue to be rigorously applied.

The reducing content of biodegradable waste to be accepted at the landfill going forward is in itself an odour mitigation measure. In addition the use of northern cells (Phase 7) for stabilised wastes and wastes suited for disposal separately to biodegradable waste is also an odour mitigation measure. The advantages of dedicating the northern cells to these waste types is that construction waste often contains plaster. Conventional wisdom is that plaster wastes combined with leachate from putrescible waste can increase the odour potential in wastes. By isolating the construction and stabilised wastes in Phase 7, potential impacts from mixing them with putrescible wastes are mitigated, resulting in;

- Reduced potential for landfill gas odour nuisance
- Reduced odours from working waste faces (both north and south)

Landfill Gas

There is no proposal to change the overall approach to LFG management as a consequence of these proposals. LFG will continue to be managed to the highest possible standards

Dust

There is no proposal to change the overall rigorous approach to dust control. There will be a need to establish a second wheel wash to complement the existing unit for the route needed to access the northern cells in Phase 7.

15. INTERACTION OF THE FOREGOING

Sections 4 to 14 deals with the impacts from the proposed intensification of waste intake on environmental aspects such as surface water, ecology and human beings. Interactions between impacts can also occur when the impact caused by the project causes interaction or dependency with other environmental aspects. This section discusses the interaction between impacts and assesses them as positive, negative or neutral (as having no interaction or interdependency). Figure 15.1 is a matrix showing the interactions.

15.1. Interactions

Traffic

The intensification of waste intake results in increased traffic movement on the N2 (ca. 2%) before accessing the site.

The increased traffic flows will also cause a corresponding slight increase in noise level. There will also be greater visual impact from the increased traffic movements on the N2, impacting predominantly on local road users.

Noise

Both the increased traffic flows and the intensified waste deposition works will have a imperceptible noise effect on human beings in the environment. The noise model in Section 6 predicts that resulting noise from the intensification of waste intake will remain complaint with the EPA waste licence noise emission limits.

Landscape and Visual Impact

The proposal also includes dual filling in the southern and northern landfill cells, resulting in the landform being visible in a shorter time-frame to the dwellings on the northern boundary of the site. This is considered significantly positive as the landform will be visible when the filling starts in the northern cells in Phase 7 rather than having the landform approaching the dwellings over the coming years. The landform will also conceal the filling works in the remaining cells (Phase 6, Phase 5, etc) to these dwellings when complete.

Air Quality

The proposal has a significantly positive interaction between air quality and human beings. The northern cells at Phase 7 will be used for stabilised wastes and wastes suited for disposal separately to biodegradable waste with low potential for odour generation.

There is also a positive interaction between air quality and climate. The proposed intensification of waste intake will allow sufficient landfill gas generation to efficiently run the permitted gas utilisation plant and reduce the odour potential for landfill gas. This positive impact on air quality also positively impacts the climate as the methane in the landfill gas is converted to carbon dioxide, a much less harmful greenhouse gas.

Figure 15.1: Matrix of Impact Interactions

	Climate	Traffic	Noise	Soils and geology	Surface water	Groundwater	Ecology	Landscape and Visual Aspects	Human Beings and Material Assets	Air quality
Climate		~	O	O	O	O	O	O	O	++
Traffic	~		-	O	O	O	O	-	-	-
Noise	O	-		O	O	O	O	O	~	O
Soils and geology	O	O	O		O	O	O	O	O	O
Surface water	O	O	O	O		O	O	O	O	O
Groundwater	O	O	O	O	O		O	O	O	O
Ecology	O	O	O	O	O	O		O	O	O
Landscape and Visual Aspects	O	-	O	O	O	O	O		++	O
Human Beings and Material Assets	O	-	~	O	O	O	O	++		++
Air quality	++	-	O	O	O	O	O	0	++	

Legend

O	Neutral	-	Slight negative	+	Slight positive
~	Imperceptible impact	--	Significant negative	++	Significant positive

15.2. Cumulative Impacts with Other Projects

A planning search was undertaken for applications in the townlands of Knockharley, Flemingstown and Tuiterath. There are no known parallel applications that will cause impacts that will accumulate or interact with the proposed intensification of waste intake at Knockharley to create a significant effect.